DIMENSION BID

PETRONAS

DULANG – D05S
WATER INJECTOR
NEAR WELLBORE ACID WASH

Revision:	2
Prepared for:	Hong Pei Wong
Date Prepared:	17th July 2024
Well:	D-05S
Field:	Dulang Delta
Operation Region:	PMA
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DESIGN VERIFICATION

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REVIEWED BY DB CTS Technical Advisor	 Kung Yee Han	17/7/2024 Date
APPROVED BY DB CTS Operation Manager	 Aliff Adenan	17/7/2024 Date
APPROVED BY PCSB Dulang D Well Intervention Engineer	Hong Pei Wong	Date
APPROVED BY PCSB Technical Professional Well Intervention, PMA	M Izwan B A Jalil	Date
APPROVED BY PCSB Head of Cluster 2 Well Intervention, PMA	Ahmad Hafizi B Ahmad Zaini	Date

Remark: Do not execute the procedures in this document if it is not fully approved and signed by all parties.

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PERSONNEL CONTACT

Any means of following doubt / unusual parameters / Emergency, please contact Dimension Bid personnel in onshore immediately.

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REVISION HISTORY

Rev. No	Section	Date	Revised By
0	All	14/7/2024	Muhd Ameerul Zaeem
1	Revise on decision tree, chemical recipe for TSW & update MASTP	16/7/2024	Muhd Ameerul Zaeem
2	Utilize WIMS pump during overflush & include contingency step in case WIMS is down.	17/7/2024	Muhd Ameerul Zaeem

TABLE OF CONTENT

OBJECTIVES

The objective of this job is;

1. To perform near wellbore acid wash of E1 & E8 via bullheading to remove formation damage due to injection solids plugging and possible solids accumulation across perf interval. Subsequently improving water injector injectivity / injection rate within safe water injection operating envelope (SWIOPE)

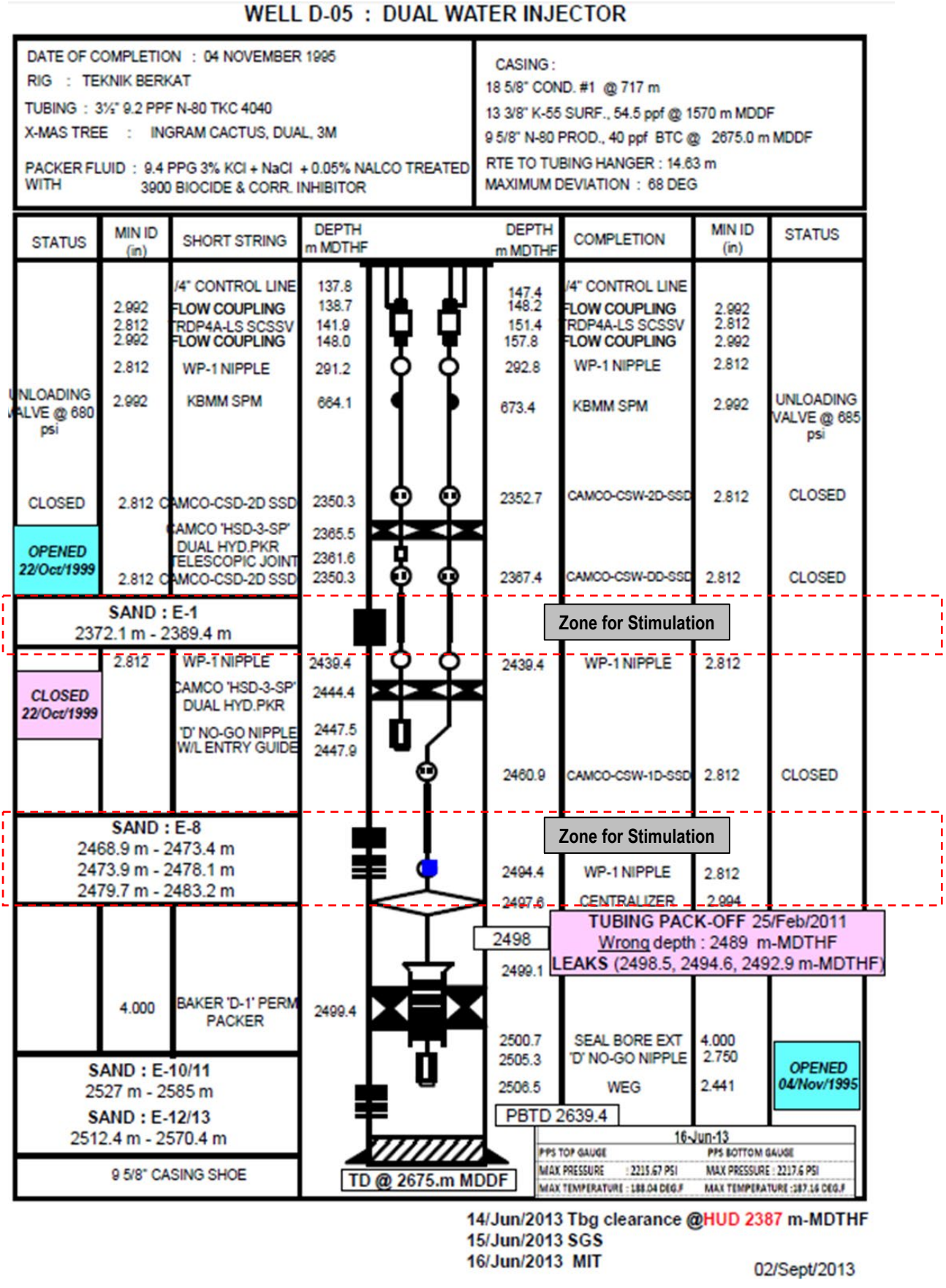
BACKGROUND

Dulang D-05 is a dual water injector well. Dimension Bid will perform near wellbore acid wash to remove formation damage due to possible plugging of solid across perf interval.

WELL DATA

Well Info	
Field Name	Dulang D
Well Type	Water Injector
Artificial Lift	N/A
Treatment Zone	E-1 (2,372 – 2,389 m-MDTHF) E-8 (2,468.9 – 2,473.4 m-MDTHF) (2,473.9 – 2,478.1 m-MDTHF) (2,479.7 – 2,483.2 m-MDTHF)
Lithology	N/A
Injectivity Index	N/A
Average Porosity	23%
Fracture Gradient	0.72 psi/ft
Pore Fluid Permeability	31.2 mD
Reservoir Pressure	944 psia
Reservoir Temperature	103 deg C

WELL DIAGRAM



OPERATION SUMMARY

Item	Job description	Remark
A	Bullheading Operation	1. Bullheading #1: Pre-Job Injectivity Test 2. Bullheading #2: Tubing Pickling, soak 2 hours
B	Slickline Operation	3. TCC 4. Shift SSD#2 Open
C	Bullheading Operation	5. Bullheading #3: Main Treatment & Post Job Injectivity Test

MAXIMUM ALLOWABLE SURFACE TREATING PRESSURE (MASTP)

Well	Zone	Fluid Density (ppg)	Mid Perf TVD (ft)	Hydrostatic Pressure (psi)	Fracture Gradient (psi/ft)	Fracture Pressure (psi)	STP	80% MASTP
D-05	E1	8.80	4379	2004	0.72	3153	1149	919
D-05	E8	8.80	4554	2084	0.72	3279	1195	956

TREATMENT VOLUME

Description	Detail
Tubing Specification	3-1/2" 9.2ppf#

Dulang D-05 **Downhole Calculation** **Prepared Date: 6/7/2024**

Tubing

Type	External Pipe			Internal Pipe			Internal Pipe			Caps	From	To	From	To	Length	Total Volume (bbls)
	OD (inch)	ID (inch)	W(lb/ft)	OD (inch)	ID (inch)	W(lb/ft)	OD (inch)	ID (inch)	W(lb/ft)	Barrel/lin (ft)	m	m	ft	ft	ft	
THF to SSD#1	3 1/2	2.992	9.2							0.00870	14.63	2350.30	48	7711	**7663**	**67**
SSD#1 to SSD#2	3 1/2	2.992	9.2							0.00870	2350.30	2365.60	7711	7762	**50**	**0.4**
SSD#2 to EOT	3 1/2	2.992	9.2							0.00870	2365.60	2447.90	7762	8032	**270**	**2**
															TOTAL	**70**

Wellbore Volume

Type	External Pipe			Internal Pipe			Internal Pipe			Caps	From	To	From	To	Length	Total Volume (bbls)
	OD (inch)	ID (inch)	W(lb/ft)	OD (inch)	ID (inch)	W(lb/ft)	OD (inch)	ID (inch)	W(lb/ft)	Barrel/lin (ft)	m	m	ft	ft	ft	
Wellbore at E1	9 5/8	8.835	40	3 1/2	2.992	9.2	3 1/2	2.992	9.2	0.05203	2358.50	2444.40	7738	8020	**282**	**15**
Wellbore at E8	9 5/8	8.835	40	3 1/2	2.992	9.2				0.06393	2444.40	2499.40	8020	8201	**180**	**12**
															TOTAL	**26**

Penetration Volume - Zone E1

Type	External Pipe			Internal Pipe			Penetration	Caps	From	To	From	To	Length	Total Volume (bbls)
	OD (inch)	ID (inch)	W(lb/ft)	OD (inch)	ID (inch)	W(lb/ft)	(in)	Barrel/lin (ft)	m	m	ft	ft	ft	
E1 Reservoir - 2 ft penetration		57.625		9 5/8			24	3.13568	2372.10	2389.40	7783	7840	**57**	**178**
													Porosity	**0.23**
													Total	**41**
E1 Reservoir - 5 ft penetration		129.625		9 5/8			60	16.23209	2372.10	2389.40	7783	7840	**57**	**921**
													Porosity	**0.23**
													Total	**212**

Penetration Volume - Zone E8

Type	External Pipe			Internal Pipe			Penetration	Caps	From	To	From	To	Length	Total Volume (bbls)
	OD (inch)	ID (inch)	W(lb/ft)	OD (inch)	ID (inch)	W(lb/ft)	(in)	Barrel/lin (ft)	m	m	ft	ft	ft	
E8 Top Reservoir - 2 ft penetration		57.625		9 5/8			24	3.13568	2468.90	2473.40	8100	8115	**15**	**46**
E8 Mid Reservoir - 2 ft penetration		57.625		9 5/8			24	3.13568	2473.90	2478.10	8117	8131	**14**	**43**
E8 Bottom Reservoir - 2 ft penetration		57.625		9 5/8			24	3.13568	2479.70	2483.20	8136	8147	**11**	**36**
													Porosity	**0.33**
													Total	**41**
E8 Top Reservoir - 5 ft penetration		129.625		9 5/8			60	16.23209	2468.90	2473.40	8100	8115	**15**	**240**
E8 Mid Reservoir - 5 ft penetration		129.625		9 5/8			60	16.23209	2473.90	2478.10	8117	8131	**14**	**224**
E8 Bottom Reservoir - 5 ft penetration		129.625		9 5/8			60	16.23209	2479.70	2483.20	8136	8147	**11**	**186**
													Porosity	**0.33**
													Total	**214**

SAFETY OPERATIONAL PROCEDURES

Prior to commencement of the Coiled Tubing / Bull-heading operation, a pre-job meeting will be held. This should be attended by the following parties as a minimum:

OIM, WSS, Pumping Supervisor, Representatives of other service companies involved and others as necessary.

Safety meetings should be held at the start of every shift and risk assessments must be evaluated during this time. Tool box talks should be held immediately prior to the job execution.

Note: The safety meeting must be driven by DB Supervisor addressing the following topics as a minimum:

1. Muster point.
2. Take list of personnel on site (Head count)
3. All personnel should review and be familiar with escape routes and emergency procedures.
4. Describe the **job objective, fluids and volumes to be pumped, pressures expected** during the job, and others.
5. Review **Dimension Bid Operations Policy and Procedure Manual.**
   - 5.1. Ensure at all steps carried out during the operations comply with this Manual.
   - 5.2. Management of change MUST be applied any time there is a need to deviate from the steps contained this procedure.
   - 5.3. A document MUST be created describing each the step of the deviation. This document shall also include the deviation Risk Assessment and it MUST be approved and signed by PCSB – Head of Well Intervention and Dimension Bid Operations Manager.
6. Exercise stops work authority if unsafe condition occurs and assess situation with all team members, resume operation after mitigation plan is in place.
7. Personnel responsibilities throughout the job.
8. Spills, fire, blow out, unexpected well behaviour.
9. Emergency shower station and eye wash station location.
10. Trapped potential energy such as pressure or coiled tubing stiffness.
11. Prepare related Job Hazard Analysis (JHA) prior commencement of any work, get approval from Client Site Representative (CSR) and review it with all personnel involved as well as to review Risk Assessment.
12. Discuss the well H_2S, CO_2, Hg (Mercury) content (if applicable).
13. Adhere all **PCSB Zeto Rules** and other guidelines.
14. Take a physical count of inventory and make sure all required materials are available on site.
15. **Barricade** the work area and display the appropriate **warning sign**.
16. On chemical mixing and handling; all personnel involved shall hold **safety meeting** and review **Safety Data Sheet** (SDS).
    - 16.1. Personnel involve during chemical handling shall be briefed by DB Chemical Specialist onsite and extra precautions must be taken. All SDS must be available on site and reviewed prior chemical handling.
    - 16.2. All non-essential personnel shall stay away from mixing site.
    - 16.3. Use PPE including respirators, hard hats, eye protection and steel-toed boots.
    - 16.4. Verify if there is any **dead Volume** in the mixing tanks and adjust volumes to account for non-usable volume in the blender / mix tank.
    - 16.5. Consider wind direction and note all trip hazards in the mix / pumping area.

16.6. Prior to mixing chemicals, clean and verify the tank/batch mixer and lines are free of any debris and or contaminants.

16.7. In case of spill; wash the place where any chemical has been spilt with available spill kit.

16.8. Take care to prevent leakage due to ejection from valves, fittings, flanges, or other joints flexible chemical hoses and pumps. Never repair the equipment during transfer into mixing tank/container.

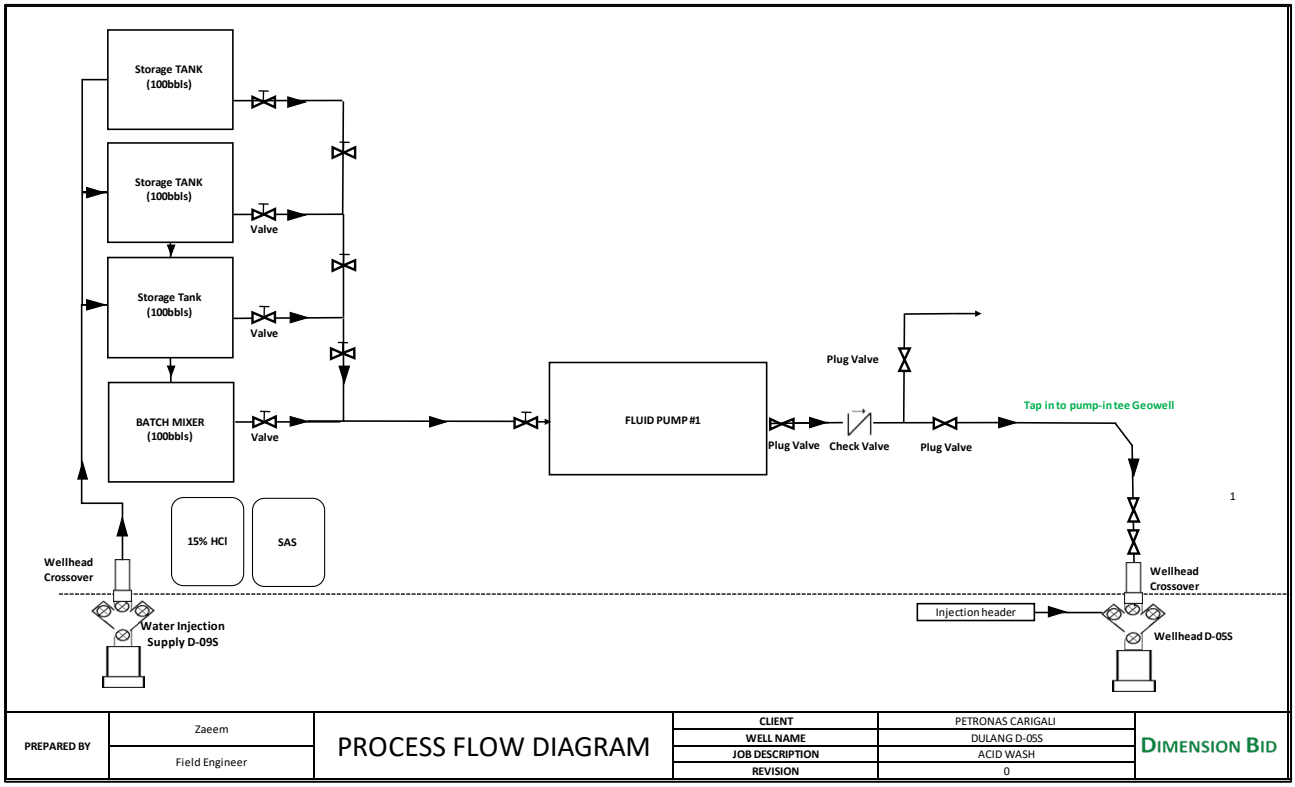
17. Take reading of Shut in / Flowing Tubing Head Pressure (SI/F/THP), Casing Head Pressure (CHP) and fluid sample (if available) prior to operation.
18. Check gas lift condition and capability with Site Operation Representative (SOR).
19. Ensure fitness prior to perform duties assigned.
20. Ensure all barriers are in place and followed.

HEALTH, SAFETY & ENVIRONMENT

1. Evaluate possible risks to arise during the job execution.
2. Evaluate risk assessment. Report any abnormal or insecure condition on site, taking into account all the steps or procedures to follow. Discuss with PCSB HSE coordinator, the execution or suspension of the job.
3. Review SDS of each product that will be used. Verify that all personnel on location handling toxic or corrosive products have the proper PPE.
4. Review the contingency plan for spills.
5. Do not vent / release any hydrocarbons from the well to atmosphere. Returns from the well should be handled safely by Flowback Company.

Prior to DB personnel walking on upper deck, DB Supervisor to inspect upper deck and ensure that the area it is in good condition (Gratings, Hatches, etc.)

PROCESS FLOW DIAGRAM



EQUIPMENT RIG-UP PROCEDURE

1. Hold a pre-job safety meeting. Discuss the rig up activities including the equipment lay out, lifting operations, crew roles and responsibilities and review the JSA as well.
2. Spot the equipment accordingly to space availability. Delegate only one personnel as the signalman and ensure every equipment has at least two tag line tied perpendicularly.
3. Rig up the LP hoses from fluid storage tanks to single pump unit.
4. Rig up 2" HP treating line as per DB Technical Standard from single pump to the pump-in tee Geowell. Ensure a bleed off line is installed in the line and secure it firmly.
5. Check the THP and record it accordingly if any.
6. Make up correct crossover to the main treating line.

   *Job Supervisor to confirm with Client Representative on well handover status prior to rigging up on the wellhead.
7. Install a plug valve after the crossover then secure all line with safety cable.
9. Proceed to prepare for pressure test. The pump operator must be able to see the main treating line pressure and communicate directly with floor personnel that can see the main treating line pressure.

PRESSURE TEST PROCEDURE

1. Job Supervisor to hold a pre-pressure testing safety meeting.
2. Perform EMC 1 for the single pump unit.
3. Prime the unit completely.
4. Ensure the entire valve are lined up above the master valve.
5. Start flush the treating lines with treated seawater.
6. Ensure the swab valve and master valve at the x-mas tree are closed.
7. Perform pressure test for the treating lines up to 500 psi and hold for 5 minutes. Inspect the lines for leaks and observe any pressure drop.
8. Increase pressure to 3000 psi and hold for 10 minutes. Inspect the lines for leaks and observe any pressure drop.
9. Once completed, bleed off pressure through the bleed off line by fully opening the master plug valve (2x1 plug valve) then slowly open the control valve (2x1 plug valve). Ensure pressure is bleed to zero.

OPERATIONAL PROCEDURE

Conduct safety meeting with all personnel on location detailing the program, pressure limitations, personnel responsibilities, emergency well control drill, and safety precautions.

BULLHEADING#1 OPERATION – PRE-JOB INJECTIVITY TEST

1. Fill up the well with 120 bbls of IW (1.1x completion volume) and perform injectivity test.
2. Prepare treatment fluids as per below recipe for pumping activity:

Injection Water			4,200	gals	100	bbls	Description
Products	**Concentration**		**Volume**				
Injection Water	1000	gptg	4,200	gals	100	bbls	Base Fluid
Mixing Instruction: 1. Fill up tank with injection water 2. Prepare to pump							

Note: The above recipe is for 100 bbls of IW. Please prepare another batch of IW if needed.

2.1. In case water injection is down, proceed to mix TSW chemical as per recipe below:

Treated Sea Water (TSW)				100	BBL	Description
Seq.	***Product***	***Concentration***		***Volume***		
1	Sea Water	994	gptg	4,175	gal	Base Fluid
2	ACM H2S Clear 200	2	gptg	8	gal	CO2 & H2S Corrosion Inhibitor
3	ACM BACT 200	2	gptg	8	gal	Micro Biocide Control
4	ACM OXYFREE 100	2	gptg	8	gal	Oxygen Scavenger
Mixing Instruction: 1. Prepare sea water in the mixing tank. 2. Add ACM H2S Clear 200 & ACM OXYFREE 100 into the tank and circulate the mixture. 3. Add ACM BACT 200 into the tank and circulate the mixture until homogenous.						

Note: The above recipe is for 100 bbls of IW. Please prepare another batch of IW if needed.

3. Manipulate surface valve to the following position prior pumping activity:

Valve	Position
Pump-In Tee Valve	OPEN
Swab Valve	OPEN
Lower Master Valve	OPEN
Wing Valve	CLOSE

4. While opening up swab valve and lower master valve, count turns for future reference.
5. Prior start pumping activity, complete the following:

5.1. Record SITHP and PCP of D-05S. Include in daily report.

SITHP	PCP

5.2. Bleed off tubing and casing pressure to minimum as possible or at least 500 psi.

6. Open plug valve at the surface line that connects to pump-in tee and start pumping according to the pumping table in **Step 7**.

6.1. **Do not exceed maximum allowable surface treating pressure 900 psi.**

6.2. While filling up tubing, record THP and PCP as per table below. Include the following table in daily report.

Time (min)	Pump Pressure (psi)	Volume (bbl)	SS THP (psi)	LS THP (psi)	PCP (psi)	Remark

7. Proceed with pump IW to fill up completion volume (**120 bbls**) prior injectivity test as per below table:

Pumping Schedule to Fill up Completion Volume for Injectivity Test						
Stage	**Description**	**Fluid**	**Vol (bbl)**	**Pump Rates (bpm)**	**Remarks**	**MASTP (psi)**
1	**Fill-up Completion Volume**	**IW**	120 bbls or till return is observed on surface. Return valve open	0.3 – 1.5	120 bbls is calculated based on 1.1x completion volume (Tubing & Wellbore)	900

8. After complete pumping as per above pumping schedule, close the return valve and do not stop pumping and continue pumping at idle rate.

8.1. Sustain each pumping rate for **5 minutes** after pressure stabilises. For last achievable rate, prolong the monitoring for 15 minutes.

8.2. DO NOT exceed **MASTP 900 psi**.

8.3. **Proposed injection rate for main treatment is 0.5 – 3 bpm.**

8.4. Begin injectivity test as per table below:

Rate (bpm)	Pumping Pressure (psi)	Time (min)	Volume (bbls)	SS THP (psi)	LS THP (psi)	PCP (psi)
0.30						
0.50						
0.70						
1.00						
1.30						
1.50						
2.00						
2.50						
3.00						

9. Fill up table and include in daily report. Report the results of injectivity test to WSS and EIC at town.

BULLHEADING#2 OPERATION –TUBING PICKLING TREATMENT

10. Record initial SITHP and Annulus Pressure of well D-05S.

SITHP	PCP

11. Bleed off THP & PCP to minimum or at least 500 psi.

12. Prepare the pre-flush and tubing pickling fluid as per below recipe;

7.5% HCl (Tubing Pickling)				3150	gals	75	bbls	Description
Seq	Product	Concentration		Volume				
1	Fresh Water	739	gptg	2,328	gals	55.43	bbls	Base Fluid
2	ACM CORR 400	4	gptg	13	gals	0.30	bbls	Acid Corrosion Inhibitor
3	MESB NE 500	4	gptg	13	gals	0.30	bbls	Non-Emulsifier
4	ACM Surf 210	3	gptg	9	gals	0.23	bbls	Surfactant
5	NH4Cl Powder	417	pptg	1,314	lbs			Clay Stabilizer
6	ACM Iron 300	10	pptg	32	lbs			Iron Sequestering
7	ACM Iron 200	15	gptg	47	gals	1.13	bbls	Iron Control
8	33% HCl	202	gptg	636	gals	15.15	bbls	Raw Acid

Mixing Instruction:
1. Fill up tank with fresh water
2. Add additives as per above sequence
3. Agitate until mixture is homogeneous

13. Manipulate surface valve to the following position prior pumping activity:

Valve	Position
Pump-In Tee Valve	OPEN
Swab Valve	OPEN
Lower Master Valve	OPEN
Wing Valve	CLOSE

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14. Open plug valve at the surface line that connects to pump-in tee and start pumping according to the table below.

Pumping Schedule for Tubing Pickling & Overflush						
Stage	Description	Fluid	Vol (bbl.)	Pump Rates (bpm)	Remarks	MASTP (psi)
1	**Pickling Solution**	7.5% HCl	70	1-3	Tubing Pickling	900
Shut in well and soak for 2 hours. Record THP for every 15 minutes during the soaking time						
2	**Overflush**	IW	522	1-3	5ft penetration into the formation / Handover well to production to turn on water injection	900

14.1. Record the following parameters while pumping. Include the following table in daily report.

Time (min)	Pump Pressure (psi)	Volume (bbl)	SS THP (psi)	LS THP (psi)	PCP (psi)	Remark

14.2. If there is an indication of pressure build up during treatment pumping, reduce the pumping rate to and limit the pressure below MASTP and complete the tr**eatment pumping.**

14.3. Soaking for 2 hours. During soaking time, **record THP for every 15 minutes**.

14.4. Handover the well to production to turn on the water injection and over-flush the treatment pumping. A total of 522 bbls injection water is required for 5ft penetration into the formation. (Last recorded water injection rate is 500 bwpd / 0.35 bpm)

14.5. In case of Water Injection is down, DB will proceed pumping 522 bbls of Treated Sea Water for Overflush. Please refer below chemical recipe for TSW:

Treated Sea Water (TSW)				**100**	***BBL***	***Description***
Seq.	***Product***	***Concentration***		***Volume***		
1	Sea Water	994	gptg	4,175	gal	Base Fluid
2	ACM H2S Clear 200	2	gptg	8	gal	CO2 & H2S Corrosion Inhibitor
3	ACM BACT 200	2	gptg	8	gal	Micro Biocide Control
4	ACM OXYFREE 100	2	gptg	8	gal	Oxygen Scavenger
Mixing Instruction: 4. Prepare sea water in the mixing tank. 5. Add ACM H2S Clear 200 & ACM OXYFREE 100 into the tank and circulate the mixture. 6. Add ACM BACT 200 into the tank and circulate the mixture until homogenous.						

15. Once completed, handover well to Slickline for TCC & zone change.

BULLHEADING#3 OPERATION – STANDALONE ACID SYSTEM (MAIN TREATMENT)

27. Prepare treatment fluid as per below:

15% HCl (Pre-Flush Acid)				5250	gals	125	bbls	Description
Seq	Product	Concentration		Volume				
1	Fresh Water	419	gptg	2,200	gals	52.38	bbls	Base Fluid
2	ACM CORR 400	4	gptg	21	gals	0.50	bbls	Acid Corrosion Inhibitor
3	MESB NE 500	4	gptg	21	gals	0.50	bbls	Non-Emulsifier
4	ACM Surf 210	3	gptg	16	gals	0.38	bbls	Surfactant
5	Ammonium Chloride	417	pptg	2,189	lbs			Clay Stabilizer
6	ACM Iron 300	25	pptg	131	lbs			Iron Sequestering
7	ACM Iron 200	15	gptg	79	gals	1.88	bbls	Iron Control
8	33% HCl	419	gptg	2,200	gals	52.38	bbls	Raw Acid
9	MESB MS 300	100	gptg	525	gals	12.50	bbls	Mutual Solvent

Mixing Instruction:
1. Fill up tank with fresh water
2. Add additives as per above sequence
3. Agitate until mixture is homogeneous

Standalone Acid System SAS				5250	gals	125	bbls	Description
Seq	Product	Concentration		Volume				
Part A								
1	Fresh Water	560	gptg	2,940	gals	70	bbls	Base Fluid
2	Iron 401	135	pptg	709	lbs			Sequestering Agent
3	Iron 305	25	pptg	131	lbs			Iron Control
4	Acetic Acid	30	gptg	158	gals	3.8	bbls	Acid Buffer
5	MESB RA 100	15	gptg	79	gals	1.9	bbls	Retard Acid
6	MESB CS 100	2	gptg	11	gals	0.3	bbls	Clay Stabilizer
7	MESB NE 500	3	gptg	16	gals	0.4	bbls	Non-Emulsifier
8	33% HCl Acid	291	gptg	1,528	gals	36.4	bbls	Raw Acid
Part B								
9	MESB MS 300	50	gptg	263	gals	6.3	bbls	Mutual Solvent
10	MESB FineSTAB 100	10	gptg	53	gals	1.3	bbls	Fine Stabilizing Agent
11	ACM CORR 401	4	gptg	21	gals	0.5	bbls	Acid Corrosion Inhibitor
Part C								
12	Ammonium Bifluoride	182	pptg	956	lbs			HF Intensifier

Mixing Instruction:
Part A
1. Fill up tank with fresh water
2. Add additives as per above sequence (1 till 8)
3. Agitate until mixture is homogeneous

Part B
1. Add additives as per above sequence (9 till 11)
2. Mix until it is homogeneous
3. Transfer into **Part A**

Part C
1. Add additives (12) into **Part A.**

Post-Flush Solvent				5250	gals	125	bbls	Description
Seq	Product	Concentration		Volume				
1	Fresh Water	863	gptg	4,531	gals	107.9	bbls	Base Fluid
2	MESB NE-Surf 200	4	gptg	21	gals	0.5	bbls	Non-Emulsifier Surfactant
3	Ammonium Chloride	417	pptg	2,189	lbs			Clay Stabilizer
4	MESB MS 300	100	gptg	525	gals	12.5	bbls	Mutual Solvent
5	MESB FineSTAB 100	10	gptg	53	gals	1.3	bbls	Fine Controlling Agent

Mixing Instruction:
1. Fill up tank with fresh water
2. Add additives as per above sequence
3. Agitate until mixture is homogeneous

28. Manipulate Surface valve to the following position prior pumping activity;

Valve	Position
Pump-In Tee Valve	OPEN
Swab Valve	OPEN
Lower Master Valve	OPEN
Wing Valve	CLOSE

29. Prior start pumping activity, complete the following:

29.1. Record SITHP and PCP. Include in daily report.

SITHP	PCP

30. Bleed off tubing and casing pressure to minimum as possible or at least 500 psi.

31. Commence pumping as per below pumping schedule:

Pumping Schedule for Main Treatment						
Stage	Description	Fluid	Vol (bbl)	Pump Rates (bpm)	Remarks	MASTP (psi)
1	**Pre-Flush Acid**	15% HCl Acid	**120**	1-3	To condition the formation	900
2	**Standalone acid system**	SAS	**120**	1-3	To dissolve fine/siliceous material	900
3	**Post Flush**	Solvent + FCA	**120**	1-3	To treat the formation with fine control agent	900
4	**Displacement fluid**	IW	**70**	1-3	To spot treatment fluid into formation	900
5	**Overflush**	IW	**522**	1-3	To displace away spent acid / Perform injectivity test after 144 bbls is pumped. After completed injectivity test, handover to production to turn on water injection.	900

32. Record the following parameters while pumping. Include the following table in daily report.

Time (min)	Pump Pressure (psi)	Volume (bbl)	SS THP (psi)	LS THP (psi)	CHP (psi)	Remark

15.1. If there is an indication of pressure build up during treatment pumping, reduce the pumping rate to and limit the pressure below MASTP and complete the treatment pumping.

15.2. In case of Water Injection is down, DB will proceed pumping 522 bbls of Treated Sea Water for Overflush. Please refer below chemical recipe for TSW:

Treated Sea Water (TSW)				**100**	***BBL***	***Description***
Seq.	***Product***	***Concentration***		***Volume***		
1	Sea Water	994	gptg	4,175	gal	Base Fluid
2	ACM H2S Clear 200	2	gptg	8	gal	CO2 & H2S Corrosion Inhibitor
3	ACM BACT 200	2	gptg	8	gal	Micro Biocide Control
4	ACM OXYFREE 100	2	gptg	8	gal	Oxygen Scavenger
Mixing Instruction: 7. Prepare sea water in the mixing tank. 8. Add ACM H2S Clear 200 & ACM OXYFREE 100 into the tank and circulate the mixture. 9. Add ACM BACT 200 into the tank and circulate the mixture until homogenous.						

16. During overflush stage, after 144 bbls of IW is pumped, proceed to injectivity test as per below step:

16.1. While filling up 144 bbls of IW, record the following parameters while pumping. Include the following table in daily report.

Time (min)	Pump Pressure (psi)	Volume (bbl)	SS THP (psi)	LS THP (psi)	CHP (psi)	Remark

16.2. Once completed fill up, sustain each pumping rate for **5 minutes** after pressure stabilises. For last achievable rate, prolong the monitoring for 15 minutes.

16.3. DO NOT exceed **MASTP 900 psi**.

16.4. Begin injectivity test as per table below:

Rate (bpm)	Pumping Pressure (psi)	Time (min)	Volume (bbls)	SS THP (psi)	LS THP (psi)	PCP (psi)
0.50						
0.70						
1.00						
1.30						
1.50						
2.00						
2.50						
3.00						

17. After completed injectivity test. Handover the well to production to turn on the water injection and over-flush the treatment pumping. A total of 522 bbls injection water is required for 5ft penetration into the formation. (Last recorded water injection rate is 500 bwpd / 0.35 bpm).

SURFACE PUMPING LINE RIG-DOWN PROCEDURE

44. Conduct safety meeting with all relevant personnel and discuss the following but not limited to trapped pressure, heavy lift, simultaneous activities, standard rig down procedures.
45. Rig down surface treating lines as per following guidelines:
    - 45.1. Ensure that all wellhead valves are closed.
    - 45.2. Ensure that all surface lines are flushed with fresh or sea water.
    - 45.3. Bleed off pressure in all surface lines to zero (0) psi
        - 45.3.1. Verify that there is no pressure trapped between valves
        - 45.3.2. It is recommended to have all valves in surface line opened to atmosphere prior to breaking up connections.
    - 45.4. Remove restrain wire from surface lines.
    - 45.5. Proceed to break connection with a hammer in good condition.
    - 45.6. Rig down pumping-tee, riser / lubricator and cross-over.
    - 45.7. Properly place the surface treating lines in the iron basket.

DECISION TREE