Form 3160-5
(August 2007)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

OCD Hobbs

FORM APPROVED
OMB NO. 1004-0135
Expires: July 31, 2010

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to re-enter an abandoned well. Use form 3160-3 (APD) for such proposals.

HOBBS OCD

SUBMIT IN TRIPLICATE - Other instructions on reverse side.

MAR 30 2015

RECEIVED

1. Type of Well ☐ Oil Well ☐ Gas Well ☒ Other: UNKNOWN OTH	5. Lease Serial No. NMLC065863
	6. If Indian, Allottee or Tribe Name
	7. If Unit or CA/Agreement, Name and/or No.
	8. Well Name and No. ZIA AGI 1
2. Name of Operator DCP MIDSTREAM LP Contact: TOM SHARP E-Mail: tsharp@geolex.com	9. API Well No. 30-025-42208-00-X1
3a. Address 370 17TH STREET SUITE 2500 DENVER, CO 80208 5406 3b. Phone No. (include area code) Ph: 505-842-8000	10. Field and Pool, or Exploratory AGI
4. Location of Well *(Footage, Sec., T., R., M., or Survey Description)* Sec 19 T19S R32E Lot 3 2100FSL 950FWL 32.644599 N Lat, 103.811145 W Lon	11. County or Parish, and State LEA COUNTY, NM

12. CHECK APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION			
☒ Notice of Intent	☐ Acidize	☐ Deepen	☐ Production (Start/Resume)	☐ Water Shut-Off
☐ Subsequent Report	☐ Alter Casing	☐ Fracture Treat	☐ Reclamation	☐ Well Integrity
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☒ Other Workover Operations
	☐ Change Plans	☐ Plug and Abandon	☐ Temporarily Abandon	
	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	

13. Describe Proposed or Completed Operation (clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recomplete horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports shall be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompletion in a new interval, a Form 3160-4 shall be filed once testing has been completed. Final Abandonment Notices shall be filed only after all requirements, including reclamation, have been completed, and the operator has determined that the site is ready for final inspection.)

The Well Completion Plan for Zia AGI #1, including the SRT procedure, is attached to this 3160-5 submittal. DCP intends to perforate, swab, acidize and step-rate-test (SRT) each zone laid out in our proposed perforations in about 50 feet intervals; so there will be multiple SRTs with perhaps a final one for the entire well depending on results.

The work will begin at the bottom and work the way up using a retrievable bridge plug to isolate lower zones as we move up hole. The results will be plotted and described in a SRT Report that will be submitted on line with Form 3160-5.

The work is tentatively scheduled for the week of March 22, 2015 pending BLM approval of this submittal.

SEE ATTACHED FOR CONDITIONS OF APPROVAL

14. I hereby certify that the foregoing is true and correct.

Electronic Submission #295680 verified by the BLM Well Information System
For DCP MIDSTREAM LP, sent to the Hobbs
Committed to AFMSS for processing by ED FERNANDEZ on 03/23/2015 (15EF0035SE)

Name *(Printed/Typed)* TOM SHARP — Title GEOLEX CONSULTANT TO DCP

Signature (Electronic Submission) — Date 03/20/2015

APPROVED
MAR 23 2015
BUREAU OF LAND MANAGEMENT
CARLSBAD FIELD OFFICE

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved By EDWARD FERNANDEZ — Title PETROLEUM ENGINEER — Date 03/23/2015

Conditions of approval, if any, are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

Office Hobbs

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

**** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ****

SEE ATTACHED FOR CONDITIONS OF APPROVAL

MAR 31 2015

30-025-42208

PB Energy Storage Services, Inc. SUBSURFACE	WELL WORKOVER PROGRAM	Project Number 185853B
	DCP MIDSTREAM, LP ZIA AGI #1	As of Date 3/16/2015
	COMPLETION PROGRAM	Page 1 of 4

Operator Name: DCP Midstream, LP
Well: Zia AGI #1
Lease No.: NMLC065863
County, State: Lea County, NM
Section: 19 Township: 19S Range: 32E

Order No.:
API #: 30-025-42208
OCD District 2: Hobbs

WELLBORE CONFIGURATION AND CASING PROGRAM

Current Wellbore Configuration:

20" Conductor Pipe: 0 - 120 ft (Augered)
13 3/8", 48# Surface Casing: 0 – 842 ft (17 1/2" Hole)
9-5/8", 47# Intermediate Casing: 0 – 4,889 ft MD (4,799 ft TVD) 12-1/4" Hole
7 5/8", 29.7# Production Casing: 0 – 316 ft MD (316 ft TVD) 8 ½" Hole
7", 26# HCL-80 Production Casing: 316 ft – 5,305 ft MD (5,220 ft TVD) 8 ½" Hole
7", 26# 28Cr Production Casing: 5,305 ft MD – 5,615 ft MD (5,220 ft TVD – 5,520 ft TVD) 8 ½" Hole
7", 26# HCL-80 Production Casing: 5,615 ft MD – 6,342 ft MD (5,520 ft TVD – 6,240 ft TVD) 8 ½" Hole

Total Depth: 6,344 ft MD (6,147 ft TVD) (Cased Hole)

Proposed Wellbore Completion:

3 1/2", 9.3#, L-80 TTS8-CIGL Tubing: 0 – 250 ft (Cased Hole)
Halliburton Subsurface Safety Valve (SSSV), Vam Top thread, set at 250 ft
3 1/2", 9.3#, L-80 TTS8-CIGL Tubing: 250 – 5,430 ft MD (5,320 ft TVD)
3 1/2", 9.3#, SM2550 Tubing: 5,430 ft MD -5,550 ft MD (5,320 ft TVD – 5,440 ft TVD)
Schlumberger Pressure / Temperature Sub
Halliburton 7" "BWD" Perma-Series Packer at 5,550 ft MD (5,440 ft TVD)
Perforation Zone: 5,595 ft MD – 6,240 ft MD (Lower Cherry Canyon, Upper Brushy Canyon)

PROPOSED COMPLETION/STIMULATION PLAN

Due to low permeabilities measured from rotary cores taken from the well, and in the event the well is unable to inject the required amount of acid gas fluid (up to 2.5 bpm) and stay below the C-108 permitted surface pressure of 2,233 psi, PB recommends the following general procedure to maximize the chances of stimulating the well to achieve its originally designed purpose.

We are consulting with both Schlumberger and Halliburton to determine the best way forward, and their recommendations are still being developed. However, we believe the general procedure will follow this approach:

1. Re-enter well and drill DV tool, and go to bottom and tag the float collar.
2. Run a Segmented Bond Log (USIT) on the 7" production casing. Pressure test 7" casing

See COA

SEE ATTACHED FOR CONDITIONS OF APPROVAL

3. Possibly run a cased hole Dipole Sonic log for rock properties and fracture pressure analysis.
4. Perforate no more than 50 ft of injection interval beginning at bottom of zone. (Follow with "stim-guns" as necessary to increase perforation length.)
5. Run in hole with test packer and 2 7/8" workstring. Place packer within 25 ft of top perforation.
6. Swab well for evidence of movable oil in sample (could take possibly 2-3 days depending on swabbing efficiency). Report results to BLM. see COA
7. If no oil is present, and BLM agrees to move forward, proceed to Step 8. Otherwise wait on orders from BLM/DCP.
8. Conduct injection and step rate tests to gauge injectivity of well as per attached schedule. Each injection rate should be ½ hour. Record and plot rate vs pressure. Determine fracture initiation pressure from plot. (NOTE: if injection pressures are significantly less than anticipated, adjust rates so that 3 rates are below frac pressure and 3 rates are above frac pressure.) Do not exceed ~~6,000 psi of bottom hole pressure. (1.0 psi / ft gradient)~~ A 0.7 PSI per ft See COA see COA
9. Pump 2 gal 15% HCl acid per hole of perforation at high rate (up to 3,500 psi) to insure acid diverts to lowest perforation. Energize the acid with nitrogen to help with cleanup if necessary. Recover and dispose of spent acid from well.
10. Remove test packer and workstring from hole, then run in with retrievable bridge plug and set approximately 25 ft above top perf.
11. Repeat steps 4-9 until entire interval is treated.
12. Remove the bridge plugs, test packer and workstring from hole after last zone is treated.
13. Run downhole pressure recorders on DTS slickline. Conduct a distributed temperature survey to determine the injection profile followed by an injection/pressure falloff test of the combined interval.
14. Run 3 ½" fiberglass lined tubing and CRA tubing, set permanent packer, install P/T sub, and install SSSV.
15. Pump packer fluid (red dye diesel #2) to fill annulus and land 3 ½" TTS8-CIGL tubing
16. Install injection tree and perform MIT test for NMOCD
17. Rig down and remediate location as necessary.

SEE ATTACHED FOR CONDITIONS OF APPROVAL

Zia #1 Step Rate Test

(Perf interval = 50 ft)

(Low Rate, High Pressure)

Step	Time (min)	Rate (bpm)	Rate (gpm)	Volume Pumped (bbl)	Volume Pumped (gal)	Cum (bbl)
1	60	0.1	4.2	6.0	252.0	6.0
2	30	0.2	8.4	6.0	252.0	12.0
3	30	0.3	12.6	9.0	378.0	21.0
4	30	0.4	16.8	12.0	504.0	33.0
5	30	0.5	21.0	15.0	630.0	48.0
6	30	0.6	25.2	18.0	756.0	66.0
7	30	0.8	32.3	23.1	970.2	89.1

SEE ATTACHED FOR CONDITIONS OF APPROVAL

Time:	240	min
Time:	4	hrs
Volume:	89.1	bbls
Frac tanks	1	tanks

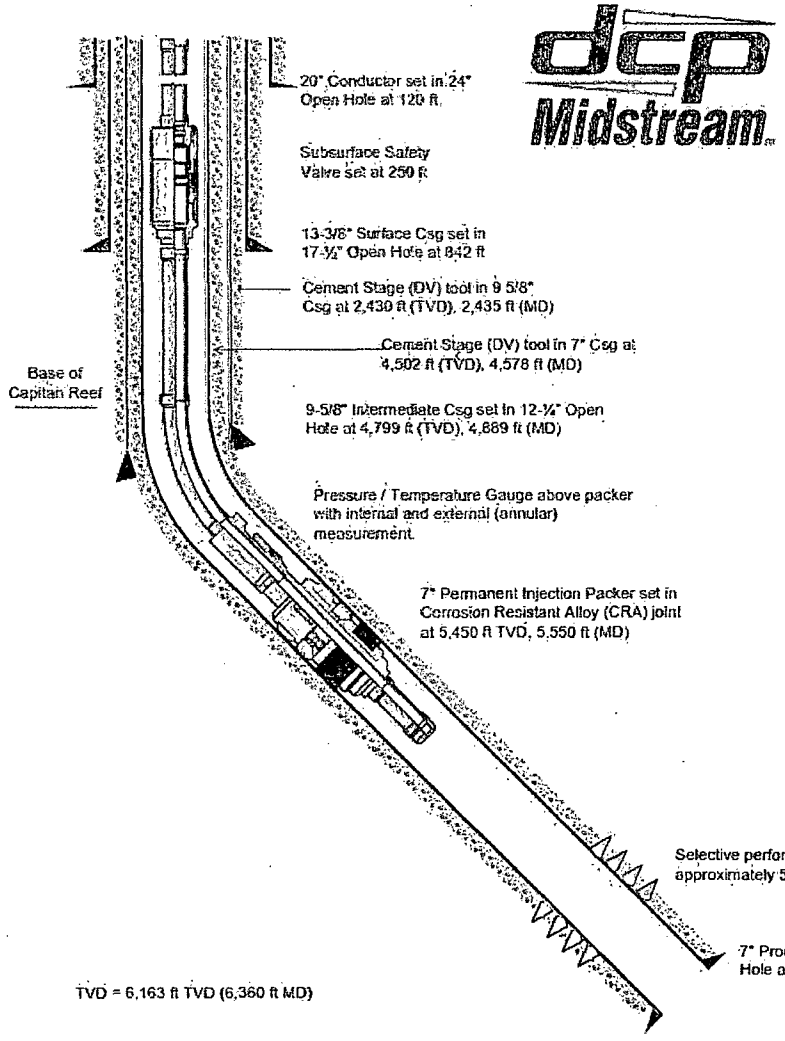
(High Rate, Low Pressure)

Step	Time (min)	Rate (bpm)	Rate (gpm)	Volume Pumped (bbl)	Volume Pumped (gal)	Cum (bbl)
1	60	0.2	8.4	12.0	504.0	12.0
2	30	0.4	16.8	12.0	504.0	24.0
3	30	0.6	25.2	18.0	756.0	42.0
4	30	0.8	33.6	24.0	1008.0	66.0
5	30	1.0	42.0	30.0	1260.0	96.0
6	30	1.2	50.4	36.0	1512.0	132.0
7	30	1.4	58.8	42.0	1764.0	174.0

Time:	240	min
Time:	4	hrs
Volume:	174	bbls
Frac tanks	1	tanks

PB Energy Storage Services, Inc.	WELL WORKOVER PROGRAM	Project Number 185853B
SUBSURFACE	DCP MIDSTREAM, LP ZIA AGI #1	As of Date 3/16/2015
	COMPLETION PROGRAM	Page 4 of 4

WELLBORE SCHEMATIC



dcp Midstream

DCP MIDSTREAM, LP
ZIA AGI #1

Location: 2,100 FSL & 350 FWL
STR: S15-T19S-R32E
County, St.: LEA COUNTY, NEW MEXICO

CONDUCTOR PIPE
20" Conductor set at 120 ft
Cemented to surface

SURFACE CASING
13-3/8", 48#, J55, ST&C set at 842 ft MD
Cemented to surface

INTERMEDIATE CASING
9-5/8", 40#, J55, LT&C set at 4,889 ft MD (4,799 ft TVD)
Cemented to surface

PRODUCTION CASING:
7 5/8", 29.7#, HCL-80 LT&C, from surface to 317 ft MD (317 ft TVD)
7", 26#, HCL-80 LT&C, from 317 ft to 5,305 ft MD (5,220 ft TVD)
7", 26#, IBCT, VAM TOP from 5,305 ft to 5,415 ft MD (5,238 ft to 5,320 ft TVD)
7", 26#, HCL-80 LT&C, from 5,615 to 6,344 ft MD (5,520 ft to 6,240 ft TVD)
Cemented to surface

PACKER:
Permanent injection packer with Incoloy components set in Corrosion Resistant Alloy (CRA) csg at 5,550 ft MD (5,450 ft TVD)

TUBING:
Subsurface Safety Valve at 250 ft MD (250 ft TVD)
3-1/2", 9.3#/ft, L80 (fiberglass lined) from surface to 5,450 ft MD (5,329 ft TVD)
3-1/2", 9.3#/ft, SM2-SS from 5,450 ft to 5,550 ft MD (5,329 ft to 5,449 ft TVD)
All tubing to include premium threads utilizing metal to metal sealing in collars

BOTTOM HOLE LOCATION (AT 5,569 ft TVD)
574' north and 206' west of surface location

KB = 25 ft

PARSONS BRINCKERHOFF

REB – 3/11/15

PREPARED BY	DATE	REVIEWED BY	DATE
R. BENTLEY	3/16/15	J. BUNDY	3/16/15

SUMMARY OF RECOMMENDED SELECTIVE PERFORATIONS

TVD, Ft.		
5595-5602[1]	Lower Cherry Canyon	Optional- thinner-bedded sandstone, low perm, good caprock
5618-5623[1]	Lower Cherry Canyon	Optional, low permeability
5628-5633[1]	Lower Cherry Canyon	Optional, low permeability
5682-5727*	Lower Cherry Canyon	Higher porosity and good to high permeability
5738-5756	Lower Cherry Canyon	Good porosity, low to moderate permeability
5789-5798	Upper Brushy Canyon	Good porosity, low permeability
5936-5942	Upper Brushy Canyon	Good porosity, low permeability
5993-6009	Upper Brushy Canyon	Good to higher porosity, low permeability
6031-6078	Upper Brushy Canyon	Good porosity, very low to moderate permeability
6101-6135*	Upper Brushy Canyon	Good porosity, moderate to good permeability
6191-6240*	Upper Brushy Canyon	Good to high porosity, moderate to good permeability

* Higher porosity-permeability zones

[1] Optional zones

Conditions of Approval

DCP Midstream, LP
Zia AGI #1, API 3002542208
T19S-R32E, Sec 19

The BLM is to be notified a minimum of 24 hours in advance for a representative to witness:

CIT / MIT tests/ Step rate Test

☒ **Lea County**
Call the Hobbs Field Station, 414 West Taylor, Hobbs NM 88240,
(575) 393-3612

A profile survey is a wireline survey log that determines what perforations are taking produced water. You may want to use the same contractor that will run your step rate test. That log presentation should list the information requested by items A-G under Item #8.

Due to being within the Lesser Prairie Chicken habitat, this workover activity will be restricted to the hours of 9:00am through 3:00am for the period of March 1 through June 15. Exceptions to these restrictions may be granted by BLM's Johnny Chopp <jchopp@blm.gov> 575.234.2227 or Bob Ballard <bballard@blm.gov> 575.234.5973

1. **Surface disturbance beyond the existing pad must have prior approval.**
2. **Closed loop system required.**
3. **Hydrogen Sulfide has been reported as a hazard in formations in the area. It is recommended that monitoring equipment be onsite for potential Hydrogen Sulfide. If Hydrogen Sulfide is encountered, please report measurements and formations to the BLM.**
4. **3000 3M BOP to be used. All blowout preventer (BOP) and related equipment (BOPE) shall comply with reasonable well control requirements. A two ram system with a blind ram and a pipe ram designed for the work string shall be adequate. Tapered work strings will require an additional pipe ram. The manifold shall comply with Onshore Oil and Gas Order #2 (3M diagrams of choke manifold equipment). The accumulator system shall have an immediately available power source to close the rams and retain 200 psi above pre-charge. The pre-charge test shall follow requirements in Onshore Order #2.**
5. **After the Bond Log is approved by the BLM; the operator shall run a Casing Integrity Test on the 5-1/5" casing. The minimum test pressure shall be the approved wellhead injection pressure of 2973psi. Document the pressure test on a calibrated recorder chart for 30 minutes.**
6. **The operator shall run a Casing Integrity Test on the 7" production casing. The minimum test pressure shall be the approved wellhead injection pressure of 2233psi. Document the pressure test on a calibrated recorder chart for 30 minutes.**

7. **BLM concurs with the proposed perforation, testing and treating the various intervals starting from the bottom up.**

8. **Swab each proposed test interval until operator has recovered formation fluids and or well has swabbed dry. Notify results to BLM via email. Sundry not required.**

The Following is for each step-rate test interval - Operator to fill out the attached Worksheet #1

A. Submit a stabilized injection profile survey for each test interval the well for review.
B. Submit the well's stabilized current psig/ft surface pressure to the top perforation.
C. Submit an anticipated bottom hole fracture pressure for the field or pool formation.
D. State the **targeted** maximum bbl/min injection rate.
E. Submit the injection fluid lbs/gal weight.
F. Submit an anticipated formation fracture or breakdown pressure at the injection top.
G. Stop injection a minimum of 48 hours and record the tubing pressure as it drops. The pressure should stabilize at or below the NMOCD permitted pressure for 8 hours. Document the pressure test on a seven day full rotation calibrated recorder chart registering within 25 to 85 per cent of its full range.
H. Calculate seven injection rates by multiplying the targeted maximum bbl/min injection by 0.05 for Step 1, 0.10 for Step 2, 0.20 for Step 3, 0.40 for Step 4, 0.60 for Step 5, 0.80 for Step 6, and 1.00 for Step 7. Record both surface and top perforation step pressures at five minute increments. Each step's time duration (usually 30 minutes) should be within 1 minute or less of the preceding step. If stabilized pressure values ($\Delta \pm 15$psig) are not obtained between the last two (five minute) increments the test results will be considered inconclusive.
I. **NOTE: Step #8 of operators procedure DO NOT exceed a pressure gradient of 0.7 psi per foot. i.e. @ 6000' max bottom hole pressure will be 4200 psi.**
J. Flow rates are to be controlled with a constant flow regulator and measured with a turbine flow meter calibrated within 0.1 bbl/min. Record those rates using a chart recorder or strip chart.
K. Use a down hole transmitting pressure device and a surface pressure device with accuracies of ± 10psig to measure pressures.
L. **Notify BLM 575-200-7902 , if there is no response, 575-361-2822 Eddy Co. or 575-393-3612 Lea Co 24 hours before beginning the test. If no answer, leave a voice mail or email with the API#, workover purpose, and a call back phone number. Note the contact, time, & date in your subsequent report.**
M. When breakdown pressure is not achieved at the **targeted rate** the formation is accepting the injection fluid without fracturing, which is the **objective**. Stop the test.
N. When the formation fracture pressure has been exceeded as evidenced by at least two rate-pressure combinations greater than the breakdown pressure stop the test and record the bottom hole Instantaneous Shut-in Pressure. This ISIP is considered the minimum pressure to hold open a fracture in this formation at this well. Fifty psig less than the ISIP is the maximum bottom hole pressure BLM will approve.

O. Record with each five minute interval the corresponding rate (bbl/min), down hole, and surface pressure (psig). Provide BLM with the tabulation of each five minute interval. Include a graph showing the stabilized pressure at each injection rate. Submit that data to BLM with the shut-in pressure recording of paragraph 8.

9. **Operator not allowed to frac well without prior approval from the BLM via Sundry NOI.**

10. **Subsequent sundry with well test and wellbore schematic required and BLM completion report required.**

WASTE MATERIAL AND FLUIDS

All waste (i.e. drilling fluids, trash, salts, chemicals, sewage, gray water, etc.) created as a result of drilling operations and completion operations shall be safely contained and disposed of properly at a waste disposal facility. No waste material or fluid shall be disposed of on the well location or surrounding area.

Porto-johns and trash containers will be on-location during fracturing operations or any other crew-intensive operations.

EGF 032315

Step Rate Work Sheet Number 1

1. Preform a minimum of seven steps, recording rate to ±0.1bpm and surface pressures to ±10psig in five minute intervals. The first two step rate pressures must be below 0.2psig/ft x depth at top of injection.

2. The last two five minute surface pressure readings of each (minimum 30 minute) step are to be within 15psig of each other. If not, hold that step injection rate past the 30 minute step until two consecutive pressure readings are within 15psig. Record the average of those two readings as the Data Point for that Step #.

Step 1				0.0	bpm pmp'd for Step 1		
Target Test Rate (5% of maximum bpd/1440 =				**0.0**	bpm (barrels per minute) for **Step 1**		
Time:	5 min	10 min	15 min	20 min	25 min	30 min	Start Time:
Surface (psig):							End Time:
Formation (psig)							**Graph Data for Point #1**
bpm:							
Time:	35 min	40 min	45 min	50 min	25 min	60 min	
Surface (psig):							Sfc psig:
Formation (psig):							F psig:
bpm:							bpd:

Step 1 has a target bpd rate of:

Step 2				0.0	bpm pmp'd for Step 2		
Target Test Rate (10% of maximum bpd/1440 =				**0.0**	bpm for **Step 2**		
Time:	5 min	10 min	15 min	20 min	25 min	30 min	Start Time:
Surface (psig):							End Time:
Formation (psig):							**Graph Data for Point #2**
bpm:							
Time:	35 min	40 min	45 min	50 min	25 min	60 min	
Surface (psig):							Sfc psig:
Formation (psig):							F psig:
bpm:							bpd:

Step 2 has a target bpd rate of:

Step 3				0.0	bpm pmp'd for Step 3		
Target Test Rate (20% of maximum bpd/1440 =				**0.0**	bpm for **Step 3**		
Time:	5 min	10 min	15 min	20 min	25 min	30 min	Start Time:
Surface (psig):							End Time:
Formation (psig):							**Graph Data for Point #3**
bpm:							
Time:	35 min	40 min	45 min	50 min	25 min	60 min	
Surface (psig):							Sfc psig:
Formation (psig)							F psig:
bpm:							bpd:

Step 3 has a target bpd rate of:

Step 4				0.0	bpm pmp'd for Step 4		
Target Test Rate (40% of maximum bpd/1440 =				**0.0**	bpm for **Step 4**		
Time:	5 min	10 min	15 min	20 min	25 min	30 min	Start Time:
Surface (psig):							End Time:
Formation (psig):							**Graph Data for Point #4**
Rate bbl/min:							
Time:	35 min	40 min	45 min	50 min	25 min	60 min	
Surface (psig):							Sfc psig:
Formation (psig):							F psig:
bpm:							bpd:

Step 4 has a target bpd rate of:

Step 5				0.0	bpm pmp'd for Step 5		
Target Test Rate (60% of maximum bpd/1440 =				**0.0**	bpm for **Step 5**		
Time:	5 min	10 min	15 min	20 min	25 min	30 min	Start Time:
Surface (psig):							End Time:
Formation (psig)							**Graph Data for Point #5**
bpm:							
Time:	35 min	40 min	45 min	50 min	25 min	60 min	
Surface (psig):							Sfc psig:
Formation (psig):							F psig:
bpm:							bpd:

Step 5 has a target bpd rate of:

Step 6				0.0	bpm pmp'd for Step 6		
Target Test Rate (80% of maximum bpd/1440 =				**0.0**	bpm for **Step 6**		
Time:	5 min	10 min	15 min	20 min	25 min	30 min	Start Time: 1800
Surface (psig):							End Time: 1830
Formation (psig)							**Graph Data for Point #6**
Rate bbl/min:							
Time:	35 min	40 min	45 min	50 min	25 min	60 min	
Surface (psig):							Sfc psig:
Formation (psig):							F psig:
bpm:							bpd:

Step 6 has a target bpd rate of:

Step 7				0.0	bpm pmp'd for Step 7		
Target Test Rate (100% of maximum bpd/1440 =				**0.0**	bpm for **Step 7**		
Time:	5 min	10 min	15 min	20 min	25 min	30 min	Start Time:
Surface (psig):							End Time:
Formation (psig):							**Graph Data for Point #7**
bpm:							
Time:	35 min	40 min	45 min	50 min	25 min	60 min	
Surface (psig):							Sfc psig:
Formation (psig):							F psig:
bpm:							bpd:

Step 7 has a target bpd rate of:

STEP RATE TEST DATA

*Well:*_____ *Date:*_____ *Operator* _____

STEP #1 Test Rate (*5% of maximum rate*) _____ *(bbl/min)*

Time (*min*) :							
Pressure (psi):							

STEP #2 Test Rate (*10% of maximum rate*) _____ *(bbl/min)*

Time (*min*) :							
Pressure (psi):							

STEP #3 Test Rate (*20% of maximum rate*) _____ *(bbl/min)*

Time (*min*) :							
Pressure (psi):							

STEP #4 Test Rate (*40% of maximum rate*) _____ *(bbl/min)*

Time (*min*) :							
Pressure (psi):							

STEP #5 Test Rate (*60% of maximum rate*) _____ *(bbl/min)*

Time (*min*) :							
Pressure (psi):							

STEP #6 Test Rate (*80% of maximum rate*) _____ *(bbl/min)*

Time (*min*) :							
Pressure (psi):							

STEP #7 Test Rate (*100% of maximum rate*) _____ *(bbl/min)*

Time (*min*) :							
Pressure (psi):							

ISIP : _____ (psi)

Test Run / Witnessed By: _____

EXAMPLE STEP RATE TEST

The following is an example of a Step-Rate Test with tabular and graphic results. The step-rate test data and graphic results of the test are on the following pages.

The operator of Anywell #1 set up a SRT for the following conditions:

A) Maximum anticipated injection rate was **4** bbl/min.

B) Following the recommended test procedures, the operator planned on using these rates for the test:

1) **5**% of 4 bbl/min = **0.2** bbl/min × 1440 m/day = 288 bbl/day
2) **10**% of 4 bbl/min = **0.4** bbl/min = 576
3) **20**% of 4 bbl/min = **0.8** bbl/min = 1152
4) **40**% of 4 bbl/min = **1.6** bbl/min = 2304
5) **60**% of 4 bbl/min = **2.4** bbl/min = 3456
6) **80**% of 4 bbl/min = **3.2** bbl/min = 4608
7) **100**% of 4 bbl/min = **4.0** bbl/min = 5760

C) The formation permeability is estimated as **100** md, therefore each step will last for 30 minutes.

For this test, the injection formation broke down at approximately 1200 psi, and the ISIP was listed as 1000 psi.

Because the injection formation will part at 1000 psi, the maximum injection pressure will be held to the ISIP. If the formation had not broken down at 1200 psi, the maximum allowable injection pressure would be the maximum pressure obtained during the test.

EXAMPLE STEP RATE TEST DATA

Well: ANYWELL #1 Date: 2/31/94 Operator Lotsa Oil Company

STEP #1 Test Rate (5% of maximum rate) 0.8 (bbl/min)

Time (min) :	0	5	10	15	20	25	30
Pressure (psi):	0	90	95	98	99	100	100

STEP #2 Test Rate (10% of maximum rate) 0.4 (bbl/min)

Time (min) :	0	5	10	15	20	25	30
Pressure (psi):	80	170	185	195	199	800	800

STEP #3 Test Rate (20% of maximum rate) 0.8 (bbl/min)

Time (min) :	0	5	10	15	20	25	30
Pressure (psi):	190	325	385	398	398	399	400

STEP #4 Test Rate (40% of maximum rate) 1.6 (bbl/min)

Time (min) :	0	5	10	15	20	25	30
Pressure (psi):	380	700	790	798	795	798	802

STEP #5 Test Rate (60% of maximum rate) 2.4 (bbl/min)

Time (min) :	0	5	10	15	20	25	30
Pressure (psi):	750	990	1050	1090	1150	1180	1201

STEP #6 Test Rate (80% of maximum rate) 3.2 (bbl/min)

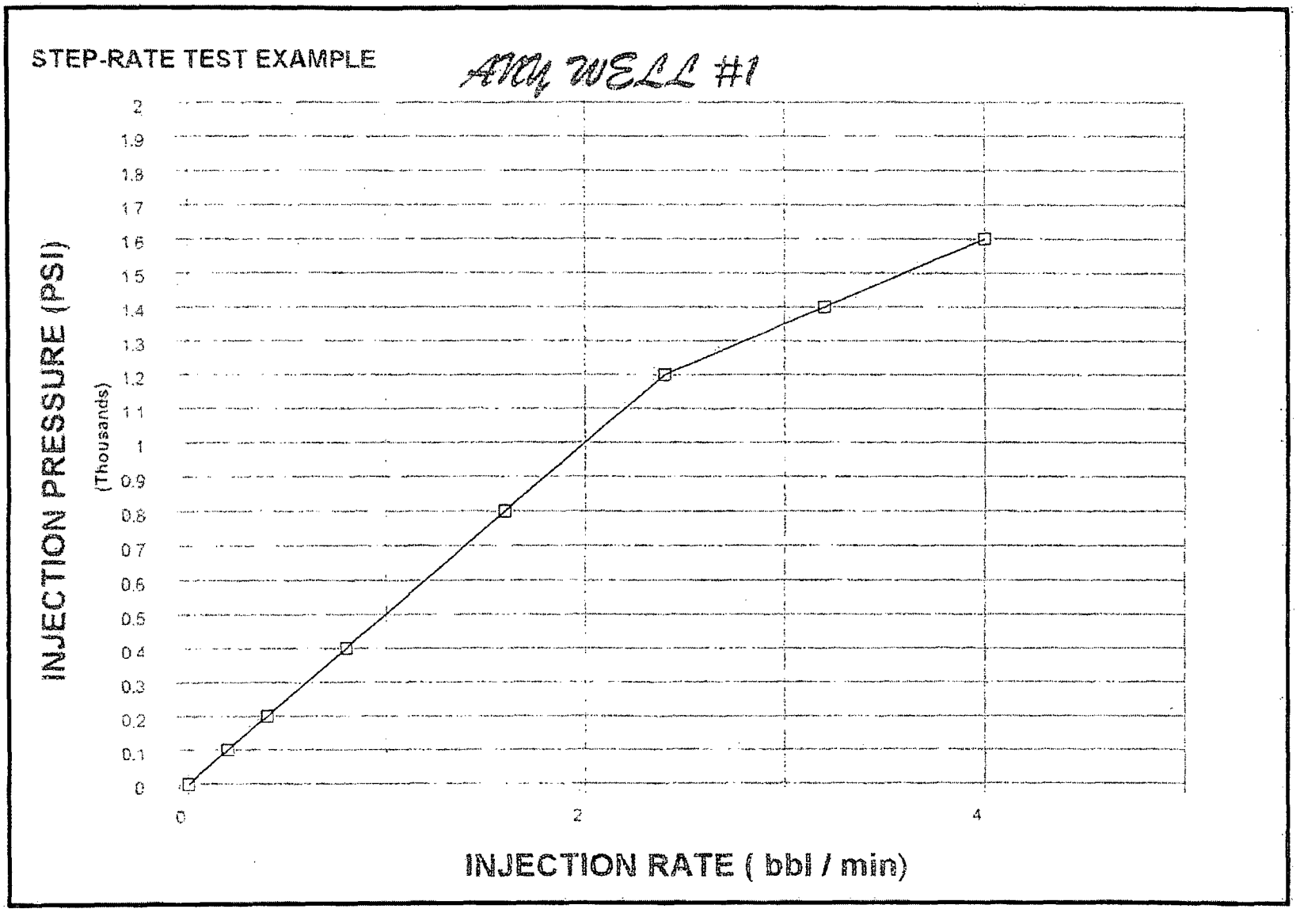
Time (min) :	0	5	10	15	20	25	30
Pressure (psi):	1100	1250	1326	1370	1390	1395	1400

STEP #7 Test Rate (100% of maximum rate) 4.0 (bbl/min)

Time (min) :	0	5	10	15	20	25	30
Pressure (psi):	1350	1450	1500	1530	1570	1590	1600

ISIP : 1000 (psi)

Test Run / Witnessed By: Alan Testor


STEP-RATE TEST EXAMPLE
ANY WELL #1
INJECTION PRESSURE (PSI)
(Thousands)
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
2
4
INJECTION RATE (bbl / min)