



Apache Corporation

Eddy County, NM (NAD27 NME)

AAO Federal SWD

#1

30-015 42549

WB2 / Job #1412259

Survey: Phoenix MWD Survey

Standard Survey Report

15 December, 2014



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #1
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3644.00usft (Capstar 133)
Site:	AAO Federal SWD	MD Reference:	KB @ 3644.00usft (Capstar 133)
Well:	#1	North Reference:	Grid
Wellbore:	WB2 / Job #1412259	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 133)	Database:	Compass 5000 GCR

Project	Eddy County, NM (NAD27 NME)		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	AAO Federal SWD				
Site Position:		Northing:	646,192.50 usft	Latitude:	32° 46' 35.15814 N
From:	Map	Easting:	531,531.10 usft	Longitude:	104° 13' 50.68027 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.06 °

Well	#1					
Well Position	+N-S	0.00 usft	Northing:	646,192.50 usft	Latitude:	32° 46' 35.15814 N
	+E-W	0.00 usft	Easting:	531,531.10 usft	Longitude:	104° 13' 50.68027 W
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	3,629.00 usft	

Wellbore	WB2 / Job #1412259				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2014	11/27/2014	7.68	60.49	48,477

Design	Surveys (Capstar 133)				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	4,475.65
Vertical Section:	Depth From (TVD) (usft)	+N-S (usft)	+E-W (usft)	Direction (°)	
	0.00	0.00	0.00	92.74	

Survey Program	Date 12/15/2014				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
60.70	4,475.65	Gyrodata Surveys (WB1 / Job #1412259)	NS-GYRO-MS	North sensing gyrocompassing m/s	
4,475.65	7,434.00	Phoenix MWD Survey (WB2 / Job #14122)	PHX+MWD+BGGM	PHX+MWD+BGGM v3: standard declination	

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
4,475.65	0.25	330.96	4,473.98	-56.30	66.73	69.34	0.00	0.00	0.00	
Tie-on to Gyrodata Gyro Survey										
4,566.00	1.30	317.50	4,564.32	-55.38	65.94	68.51	1.17	1.16	-14.90	
First Phoenix MWD Survey										
4,609.00	1.40	352.10	4,607.31	-54.50	65.54	68.07	1.88	0.23	80.47	
4,651.00	2.00	17.00	4,649.29	-53.29	65.68	68.15	2.23	1.43	59.29	
4,694.00	2.50	28.40	4,692.26	-51.74	66.35	68.74	1.56	1.16	26.51	
4,737.00	3.20	37.00	4,735.20	-49.96	67.52	69.83	1.90	1.63	20.00	
4,822.00	4.70	37.30	4,820.00	-45.30	71.05	73.14	1.76	1.76	0.35	

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Well:	#1	North Reference:	Grid
Wellbore:	WB2 / Job #1412259	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 133)	Database:	Compass 5000 GCR

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
4,907.00	5.10	30.50	4,904.69	-39.27	75.08	76.87	0.83	0.47	-8.00	
4,993.00	4.30	17.10	4,990.40	-32.89	77.97	79.45	1.57	-0.93	-15.58	
5,035.00	3.80	10.50	5,032.30	-30.02	78.69	80.03	1.63	-1.19	-15.71	
5,121.00	2.70	345.60	5,118.16	-25.26	78.70	79.82	2.05	-1.28	-28.95	
5,206.00	2.60	5.90	5,203.07	-21.40	78.40	79.34	1.10	-0.12	23.88	
5,292.00	3.70	32.60	5,288.95	-17.12	80.10	80.83	2.10	1.28	31.05	
5,377.00	4.00	59.70	5,373.76	-13.31	84.14	84.68	2.15	0.35	31.88	
5,463.00	4.00	75.90	5,459.56	-11.07	89.64	90.06	1.31	0.00	18.84	
5,548.00	3.60	89.40	5,544.37	-10.32	95.18	95.56	1.15	-0.47	15.88	
5,633.00	3.00	120.60	5,629.24	-11.42	99.76	100.20	2.19	-0.71	36.71	
5,719.00	2.00	114.70	5,715.15	-13.20	103.06	103.58	1.20	-1.16	-6.86	
5,804.00	1.40	155.10	5,800.12	-14.76	104.85	105.43	1.53	-0.71	47.53	
5,890.00	2.30	155.60	5,886.07	-17.28	106.00	106.71	1.05	1.05	0.58	
5,975.00	1.90	145.40	5,971.01	-20.00	107.51	108.34	0.64	-0.47	-12.00	
6,061.00	2.20	94.10	6,056.97	-21.29	109.96	110.86	2.09	0.35	-59.65	
6,143.00	1.20	322.60	6,138.95	-20.72	111.01	111.88	3.81	-1.22	-160.37	
6,231.00	2.50	292.80	6,226.90	-19.24	108.68	109.48	1.79	1.48	-33.86	
6,317.00	1.30	299.20	6,312.85	-18.04	106.10	106.84	1.41	-1.40	7.44	
6,403.00	1.30	298.30	6,398.83	-17.10	104.39	105.09	0.02	0.00	-1.05	
6,488.00	1.40	296.30	6,483.81	-16.18	102.61	103.27	0.13	0.12	-2.35	
6,574.00	1.50	293.90	6,569.78	-15.26	100.64	101.26	0.14	0.12	-2.79	
6,659.00	1.50	334.70	6,654.75	-13.81	99.15	99.70	1.23	0.00	48.00	
6,744.00	1.70	8.40	6,739.72	-11.55	98.86	99.30	1.11	0.24	39.65	
6,826.00	1.80	25.40	6,821.68	-9.19	99.59	99.91	0.64	0.12	20.73	
6,914.00	2.10	34.30	6,909.63	-6.61	101.09	101.29	0.48	0.34	10.11	
6,999.00	2.10	41.60	6,994.58	-4.16	103.00	103.08	0.31	0.00	8.59	
7,085.00	1.80	62.60	7,080.53	-2.36	105.25	105.24	0.89	-0.35	24.42	
7,170.00	1.40	81.60	7,165.49	-1.59	107.46	107.41	0.78	-0.47	22.35	
7,255.00	0.80	122.10	7,250.48	-1.75	108.99	108.95	1.11	-0.71	47.65	
7,340.00	1.30	157.50	7,335.47	-2.96	109.86	109.88	0.94	0.59	41.65	
7,383.00	1.50	170.00	7,378.45	-3.96	110.15	110.21	0.85	0.47	29.07	
Last Phoenix MWD Survey										
7,434.00	1.50	170.00	7,429.44	-5.28	110.38	110.50	0.00	0.00	0.00	
Projection to Bit										

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
4,475.65	4,473.98	-56.30	66.73	Tie-on to Gyrodata Gyro Survey	
4,566.00	4,564.32	-55.38	65.94	First Phoenix MWD Survey	
7,383.00	7,378.45	-3.96	110.15	Last Phoenix MWD Survey	
7,434.00	7,429.44	-5.28	110.38	Projection to Bit	

Company:	Apache Corporation	Local Co-ordinate Reference:	Well #1
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3644.00usft (Capstar 133)
Site:	AAO Federal SWD	MD Reference:	KB @ 3644.00usft (Capstar 133)
Well:	#1	North Reference:	Grid
Wellbore:	WB2 / Job #1412259	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 133)	Database:	Compass 5000 GCR

Checked By: _____	Approved By: _____	Date: _____
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Phoenix Technology Services
SURVEY DATA CERTIFICATION



PHOENIX JOB NUMBER

1412259

OPERATOR

Apache

WELL NAME

AAO Federal SWD #1 WB2

COUNTY & STATE

Eddy County, New Mexico

API WELL NUMBER

30-015-42549

PROPOSED DIRECTION

92.74°

TIE-IN DATA						
MEASURED	VERTICAL			N-S	E-W	DATA
DEPTH	DEPTH	INCLIN	AZIMUTH	COORD	COORD	SOURCE
4,475.65 ft	4,473.98 ft	0.25	330.96	-56.30 ft	66.73 ft	Gyro

FIRST	FIRST		
SURVEY	SURVEY		
DATE	DEPTH	INCLIN	AZIMUTH
6-Dec-14	4,566.00 ft	1.30	317.50

SURVEY INSTRUMENT

TYPE

Phoenix MWD

LAST	LAST		
SURVEY	SURVEY		
DATE	DEPTH	INCLIN	AZIMUTH
12-Dec-14	7,383.00 ft	1.50	170.00

TO THE BEST OF MY KNOWLEDGE I
CERTIFY THIS SURVEY DATA TO BE
TRUE AND CORRECT.

PROJECTED	PROJECTED		
TD SURVEY	TD SURVEY		
DATE	DEPTH	INCLIN	AZIMUTH
12-Dec-14	7,434.00 ft	1.50	170.00

Joe Bass

PRINT YOUR NAME ABOVE

Joe Bass

SIGN YOUR NAME ABOVE

MAGNETIC DECLINATION OR TOTAL GRID

TOTAL CORRECTION USED	
	7.63
DECLINATION OR GRID	GRID

12-Dec

TODAY'S DATE

MWD SUPERVISOR 1

Joe Bass

DIRECTIONAL DRILLER 1

Brandon Coatney

MWD SUPERVISOR 2

N/A

DIRECTIONAL DRILLER 2

Steven Lewis

12329 Cutten Rd.,

Houston, Texas 777066

(713)337-0600 (Voice), (713)337-0599 (Fax)



Apache Corporation

Eddy County, NM (NAD27 NME)

AAO Federal SWD

#1

WB2 / Job #1412259 / 1412552

Survey: Phoenix MWD Survey Job#1412552

Standard Survey Report

02 March, 2015



Company:	Apache Corporation	Local Co-ordinate Reference:	Well #1
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3644.00usft (Capstar 133)
Site:	AAO Federal SWD	MD Reference:	KB @ 3644.00usft (Capstar 133)
Well:	#1	North Reference:	Grid
Wellbore:	WB2 / Job #1412259 / 1412552	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Capstar 133)	Database:	Compass 5000 GCR

Project	Eddy County, NM (NAD27 NME)		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	AAO Federal SWD		
Site Position:		Northing:	646,192.50 usft
From:	Map	Easting:	531,531.10 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 46' 35.15814 N
		Longitude:	104° 13' 50.68027 W
		Grid Convergence:	0.06 °

Well	#1		
Well Position	+N/-S	0.00 usft	Northing: 646,192.50 usft
	+E/-W	0.00 usft	Easting: 531,531.10 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft
		Latitude:	32° 46' 35.15814 N
		Longitude:	104° 13' 50.68027 W
		Ground Level:	3,629.00 usft

Wellbore	WB2 / Job #1412259 / 1412552				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2014	11/27/2014	7.68	60.49	48,477

Design	Surveys (Capstar 133)				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	4,475.65
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	92.74	

Survey Program	Date	3/2/2015			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
60.70	4,475.65	Gyrodata Surveys (WB1 / Job #1412259)	NS-GYRO-MS	North sensing gyrocompassing m/s	
4,475.65	7,383.00	Phoenix MWD Survey Job#1412259 (WB2)	PHX+MWD+BGGM	PHX+MWD+BGGM v3:standard declination	
7,482.00	8,656.00	Phoenix MWD Survey Job#1412552 (WB2)	PHX+MWD+BGGM	PHX+MWD+BGGM v3:standard declination	

Survey	Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
	7,383.00	1.50	170.00	7,378.45	-3.96	110.15	110.21	0.00	0.00	0.00
	Tie-on to 7383' MD Survey									
	7,482.00	2.40	196.20	7,477.40	-7.23	109.79	110.01	1.26	0.91	26.46
	First Phoenix MWD Survey									
	7,577.00	2.50	196.90	7,572.31	-11.12	108.63	109.04	0.11	0.11	0.74
	7,652.00	3.10	192.20	7,647.22	-14.67	107.73	108.31	0.86	0.80	-6.27
	7,770.00	2.30	190.90	7,765.09	-20.11	106.61	107.45	0.68	-0.68	-1.10
	7,865.00	1.10	193.00	7,860.04	-22.87	106.04	107.01	1.26	-1.26	2.21

Company: Apache Corporation
Project: Eddy County, NM (NAD27 NME)
Site: AAO Federal SWD
Well: #1
Wellbore: WB2 / Job #1412259 / 1412552
Design: Surveys (Capstar 133)

Local Co-ordinate Reference: Well #1
TVD Reference: KB @ 3644.00usft (Capstar 133)
MD Reference: KB @ 3644.00usft (Capstar 133)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Compass 5000 GCR

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
7,961.00	1.10	143.90	7,956.03	-24.52	106.38	107.43	0.95	0.00	-51.15
8,056.00	1.50	95.80	8,051.01	-25.38	108.15	109.24	1.18	0.42	-50.63
8,151.00	2.50	124.60	8,145.95	-26.68	111.10	112.24	1.46	1.05	30.32
8,247.00	1.50	134.40	8,241.89	-28.75	113.72	114.96	1.10	-1.04	10.21
8,342.00	1.60	157.00	8,336.86	-30.84	115.12	116.47	0.65	0.11	23.79
8,437.00	1.60	162.30	8,431.82	-33.33	116.04	117.50	0.16	0.00	5.58
8,532.00	0.20	215.10	8,526.81	-34.72	116.35	117.88	1.57	-1.47	55.58
8,607.00	0.10	32.90	8,601.81	-34.78	116.31	117.84	0.40	-0.13	237.07
Last Phoenix MWD Survey									
8,656.00	0.10	32.90	8,650.81	-34.70	116.36	117.88	0.00	0.00	0.00
Projection to TD									

Survey Annotations

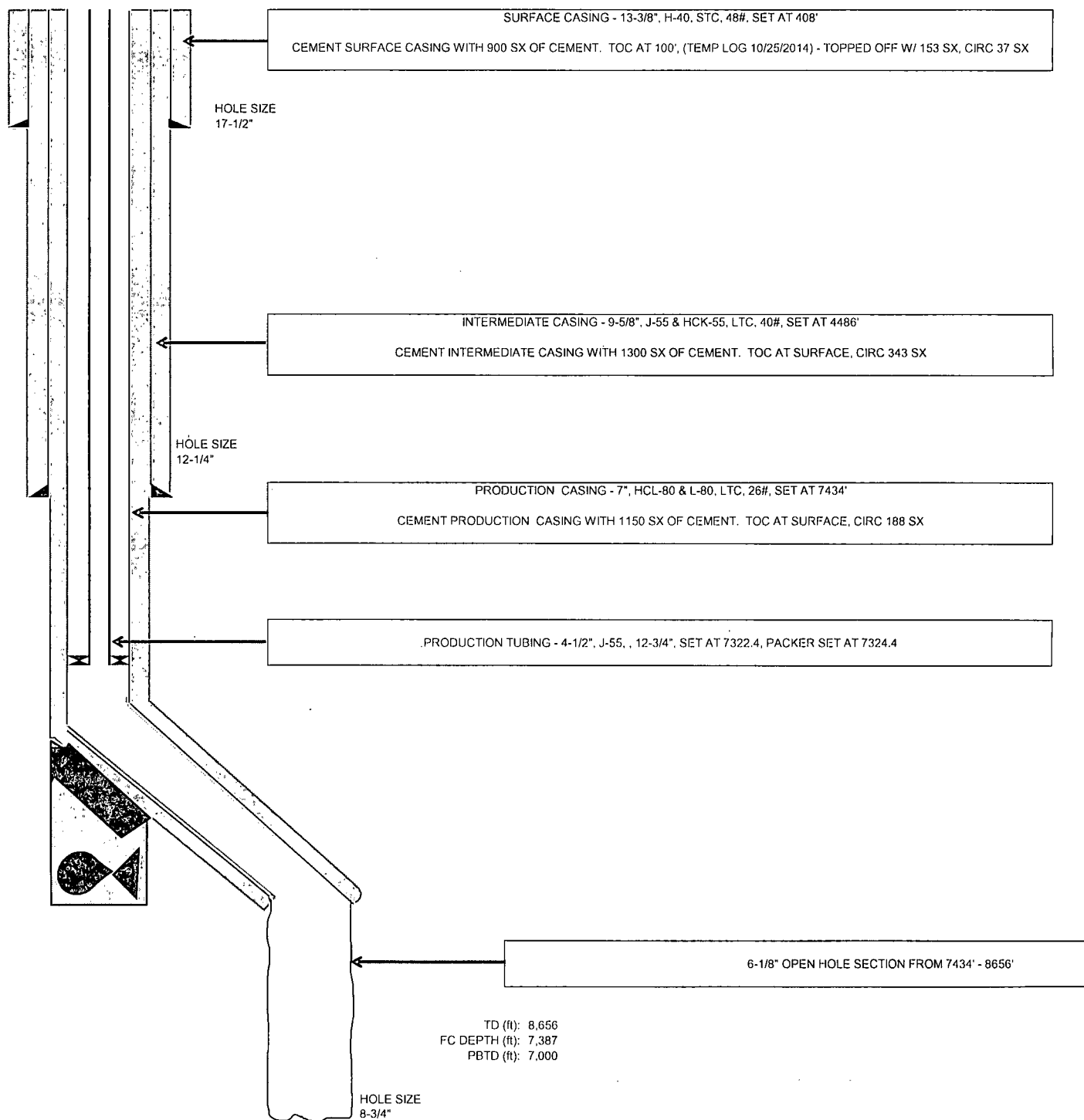
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
7,383.00	7,378.45	-3.96	110.15	Tie-on to 7383' MD Survey
7,482.00	7,477.40	-7.23	109.79	First Phoenix MWD Survey
8,607.00	8,601.81	-34.78	116.31	Last Phoenix MWD Survey
8,656.00	8,650.81	-34.70	116.36	Projection to TD

Checked By: _____ Approved By: _____ Date: _____

SURFACE LOC: 2470' FNL & 2380' FEL
SECTION 1
TOWNSHIP 18-S
RANGE 27-E
SURVEY BASIN SURVEYS

DRILL RIG: CAPSTAR 133
RIG RELEASE: 12/22/2014

KB (ft): 3642
GL (ft): 3629
KB/GL DIFF (ft): 13
TD (ft): 8656
FC DEPTH (ft): 7387
PBSD (ft): 7000



COMPLETION:	- STAGES, JSPF, DEGREE PHASING, CLUSTERS PER STAGE, BETWEEN PERFS, BETWEEN PLUGS, HOLES PER STAGE				
STIMULON:	TOTAL ACID (gal)	TOTAL LTR (bbl)	TOTAL PROPPANT (lbs)	MAX WH RATE (bpm)	MAX WH PRESSURE (psi)
	0	0	0	0.00	0
STATUS:	PRODUCTION METHOD	LIFT TYPE	SETTING DEPTH		
	0	0	0		