

February 29, 2012

Manitoba Innovation, Energy and Mines  
Box 1359, 227 King Street West  
Virden, Manitoba  
R0M 2C0

Attention: Jennifer Abel, Chief Petroleum Engineer, Virden Office

**RE: Annual Report – Enhanced Oil Recovery Project**

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As per section 73 of the Drilling and Production Regulations, ARC Resources Ltd. (“ARC”) as operator of an Enhanced Oil Recovery (EOR) project, is submitting an annual report for the Waterflood project in the Goodlands area of Manitoba (the “Project”).

The injection wells within this Project, were originally drilled as Lower Amaranth producers. They were converted between 2002 and 2004 to water injectors to provide pressure support to the Lower Amaranth zone, while offsetting infill locations were drilled as new producers. The Lower Amaranth development was initially produced through vertical wells. More recently, there have been significant advancements in monobore horizontal drilling and completion techniques in the area, leading to increased economic recovery. ARC drilled and completed its first horizontal well within the Project utilizing this technique, 00/1-15-001-24W1, in late 2010, with production beginning in January 2011. Two additional horizontal wells were drilled in the Project in 2011. The well 02/07-10-001-24W1 was brought on production in October 2011, while 02/11-11-001-24W1 was brought on production in December.

Injection of water continues to be a challenge, injection rates continue to drop, while injection pressures remain high. This, combined with increased production from drilling, has led to a drop in the overall VRR of the Project. ARC has planned additional drilling of horizontal wells in the Project for 2012 and is continuing to evaluate ways of increasing water injection. Two methods currently being considered by ARC are to frac/re-frac the existing injectors to improve connectivity to the reservoir, or convert vertical producers into additional injectors.

As part of this year's drilling program, ARC is planning to conduct pressure surveys on the new wells in order to attempt to quantify the pressure support being provided by the injectors.



Please refer to the attached documents for information and data relating to the annual report for the Waterflood project in the Goodlands area of Manitoba.

Should you have any questions, or require additional data, please do not hesitate to contact the undersigned by telephone at 403 776 5004 or by email at [bsmink@arcresources.com](mailto:bsmink@arcresources.com)

Sincerely,



B.F. Smink, P.Eng.

List of Attachments

Attachment 1: Schematic of the Injection Facilities

Attachment 2: Map of the Water Flood including Patterns

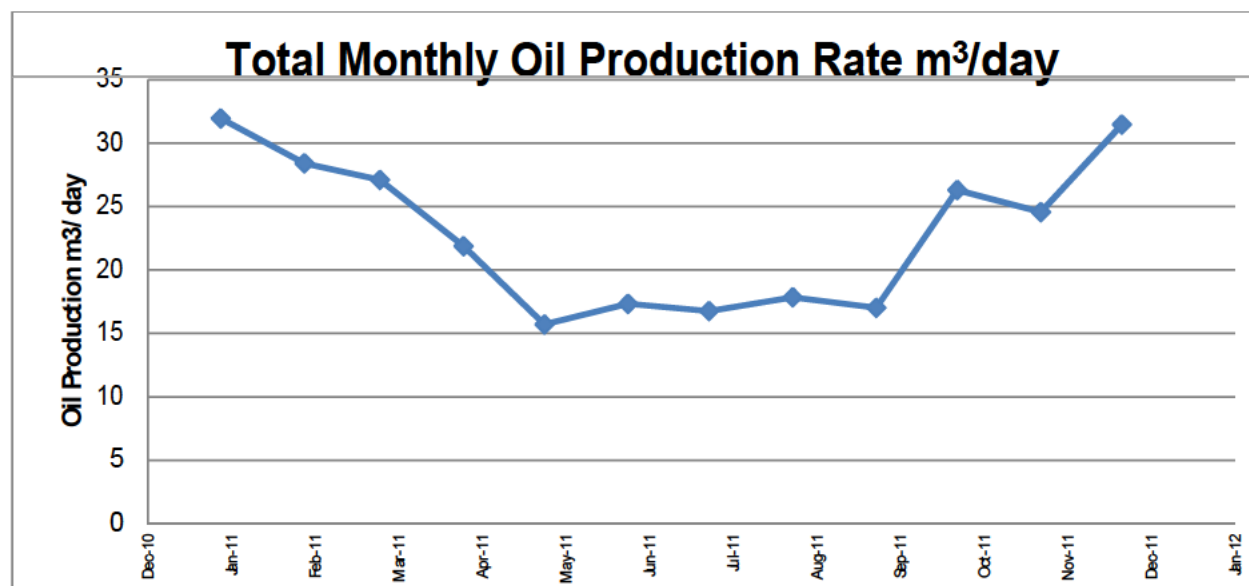
Attachment 3: Allocation factors for Waterflood Patterns

## A(i): Monthly Oil Production Rate

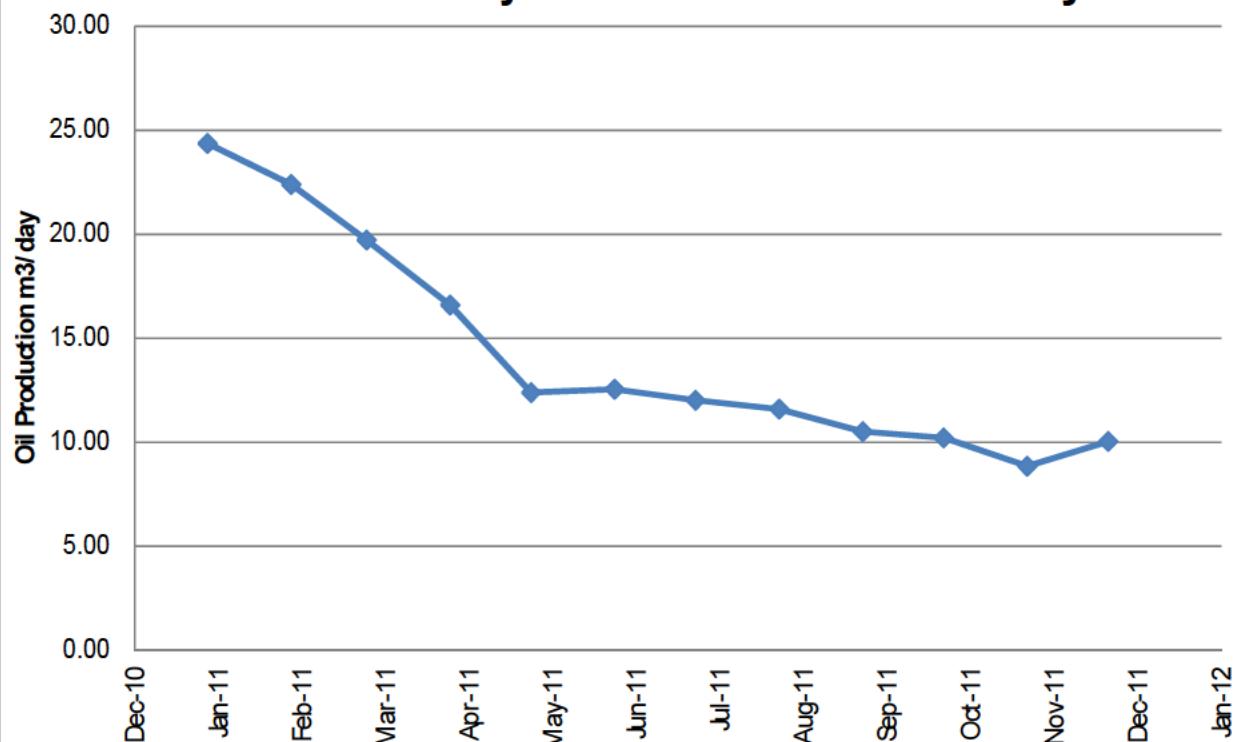
Monthly Oil Production Rate m <sup>3</sup> /day							
Date	TOTAL	Pattern A	Pattern B	Pattern C	Pattern D	Pattern E	Pattern F
Jan-11	31.95	24.36	2.93	1.94	0.87	1.44	0.33
Feb-11	28.41	22.40	1.42	1.95	1.08	0.97	0.54
Mar-11	27.11	19.72	2.68	1.76	1.00	1.41	0.47
Apr-11	21.88	16.60	1.90	1.58	0.81	0.71	0.24
May-11	15.71	12.39	0.75	1.32	0.47	0.58	0.14
Jun-11	17.34	12.55	1.23	1.50	0.78	0.99	0.22
Jul-11	16.76	12.02	1.39	1.45	0.72	0.92	0.19
Aug-11	17.85	11.59	2.77	1.62	0.73	0.88	0.16
Sep-11	17.02	10.51	2.65	1.81	0.88	0.74	0.31
Oct-11	26.31	10.21	2.29	1.99	4.82	1.67	5.22
Nov-11	24.57	8.85	1.84	1.82	4.96	1.61	5.45
Dec-11	31.47	10.04	4.82	1.91	5.60	2.90	6.20

The increase in oil production rate is a result of the newly drilled wells being brought on production. The well 00/01-15-001-24W1 came on production in January, 2011. A second well, 02/07-10-001-24W1 was brought on production in October, and a third well, 02/11-11-001-24W1 in December.

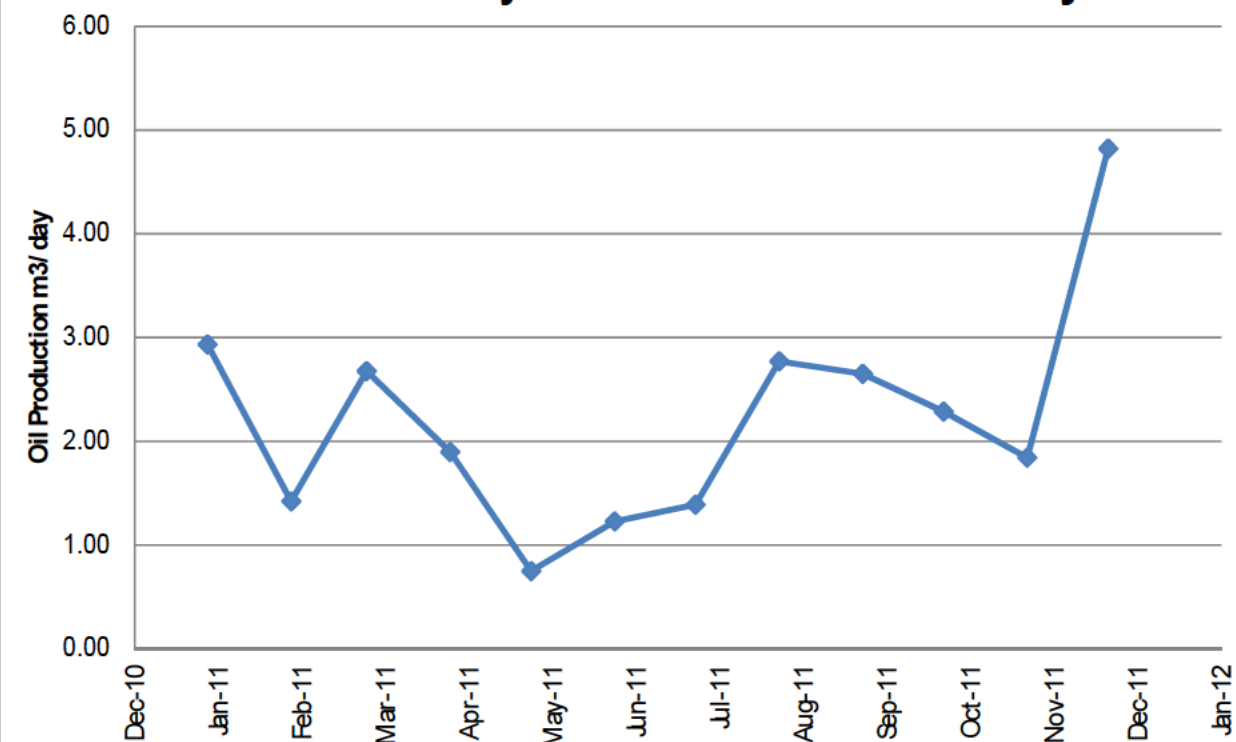
Flooding during spring break-up resulted in four wells producing a total of ~40m<sup>3</sup>/mo oil being shut-in. The first well was shut-in April, and three of wells were back on production by September. The remaining well remains shut-in due to low inflow. All patterns were affected by these wells.

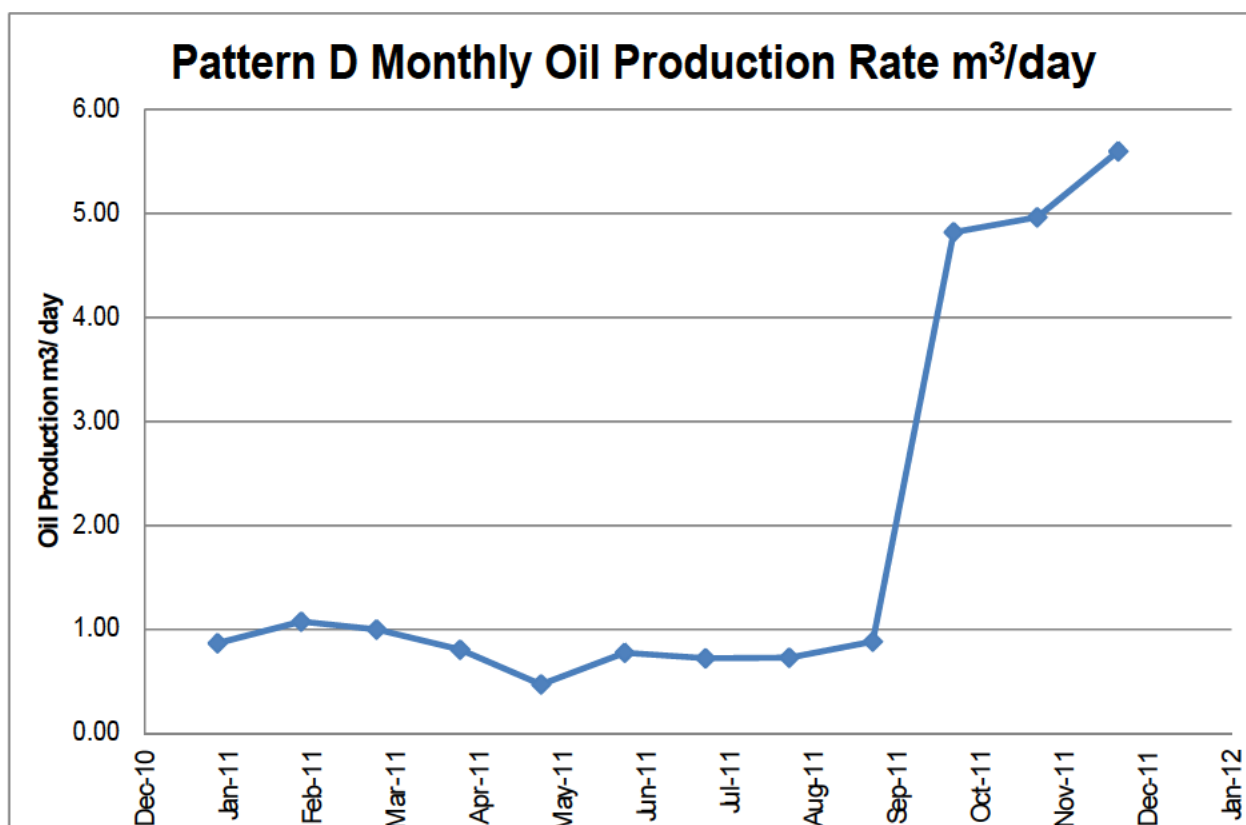
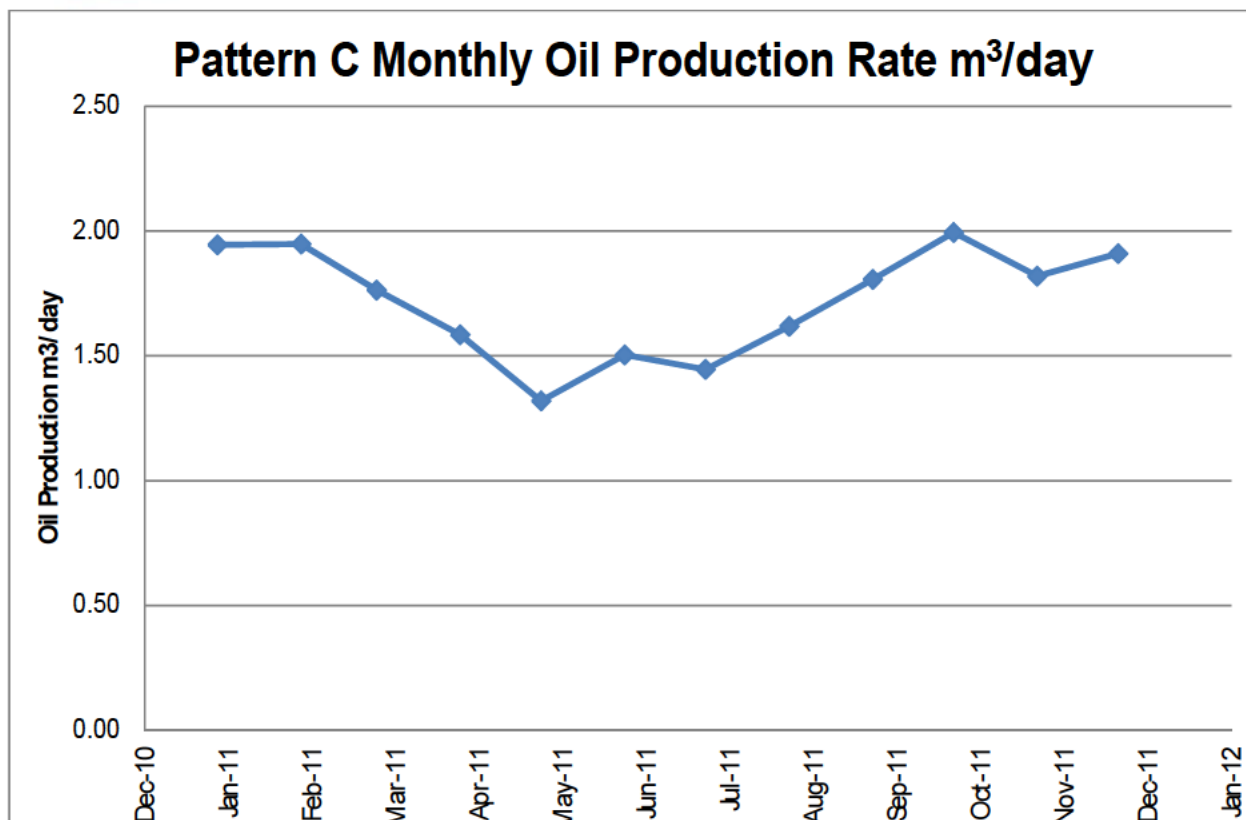


**Pattern A Monthly Oil Production Rate m<sup>3</sup>/day**

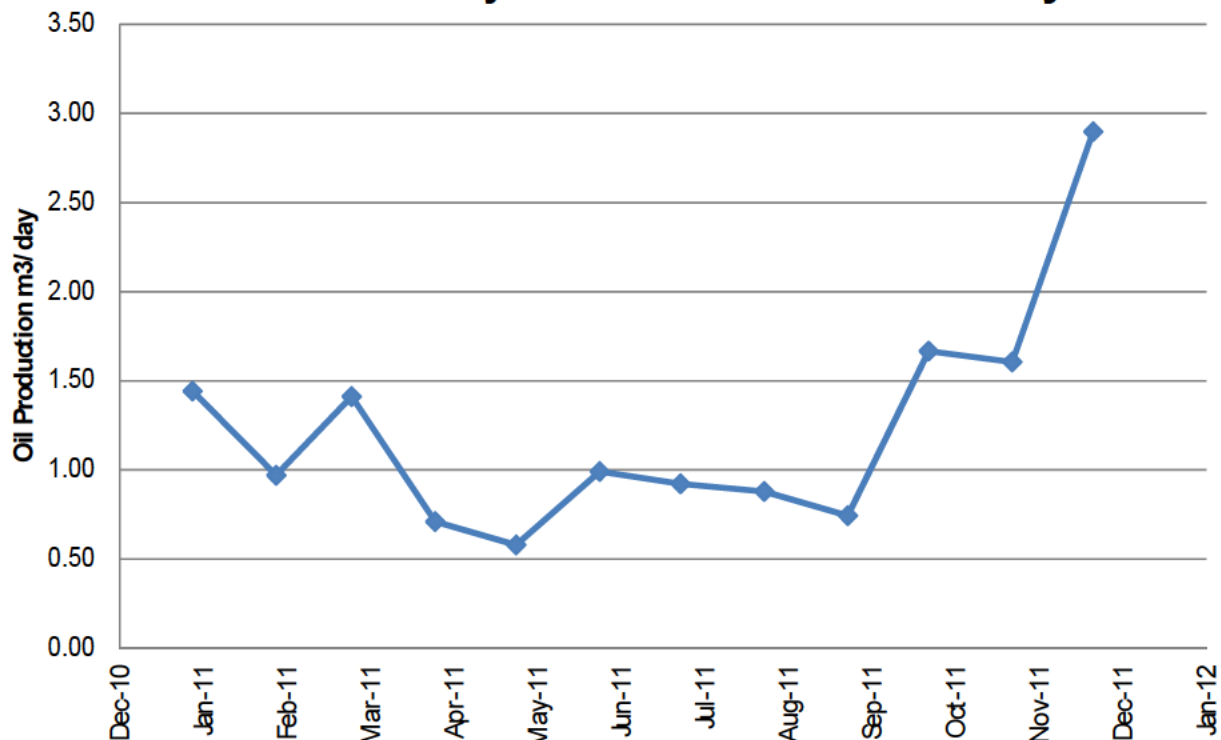


**Pattern B Monthly Oil Production Rate m<sup>3</sup>/day**

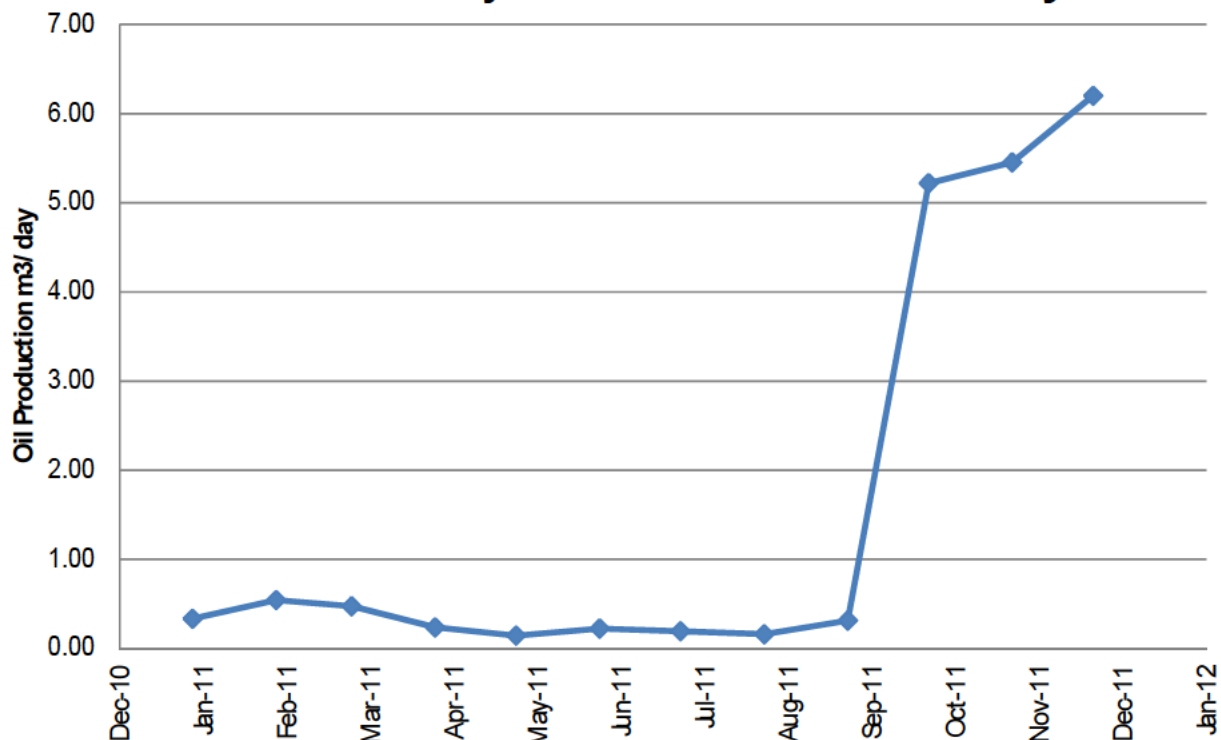




**Pattern E Monthly Oil Production Rate m<sup>3</sup>/day**



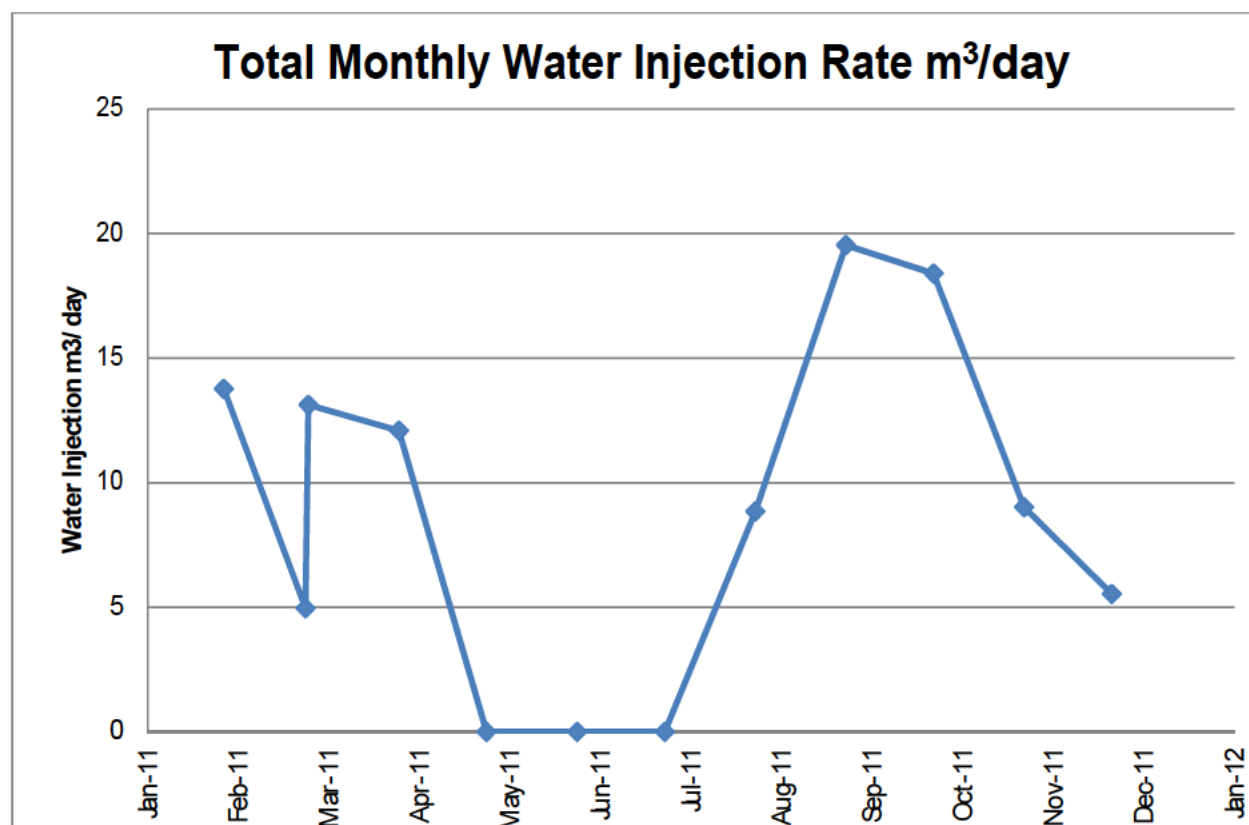
**Pattern F Monthly Oil Production Rate m<sup>3</sup>/day**

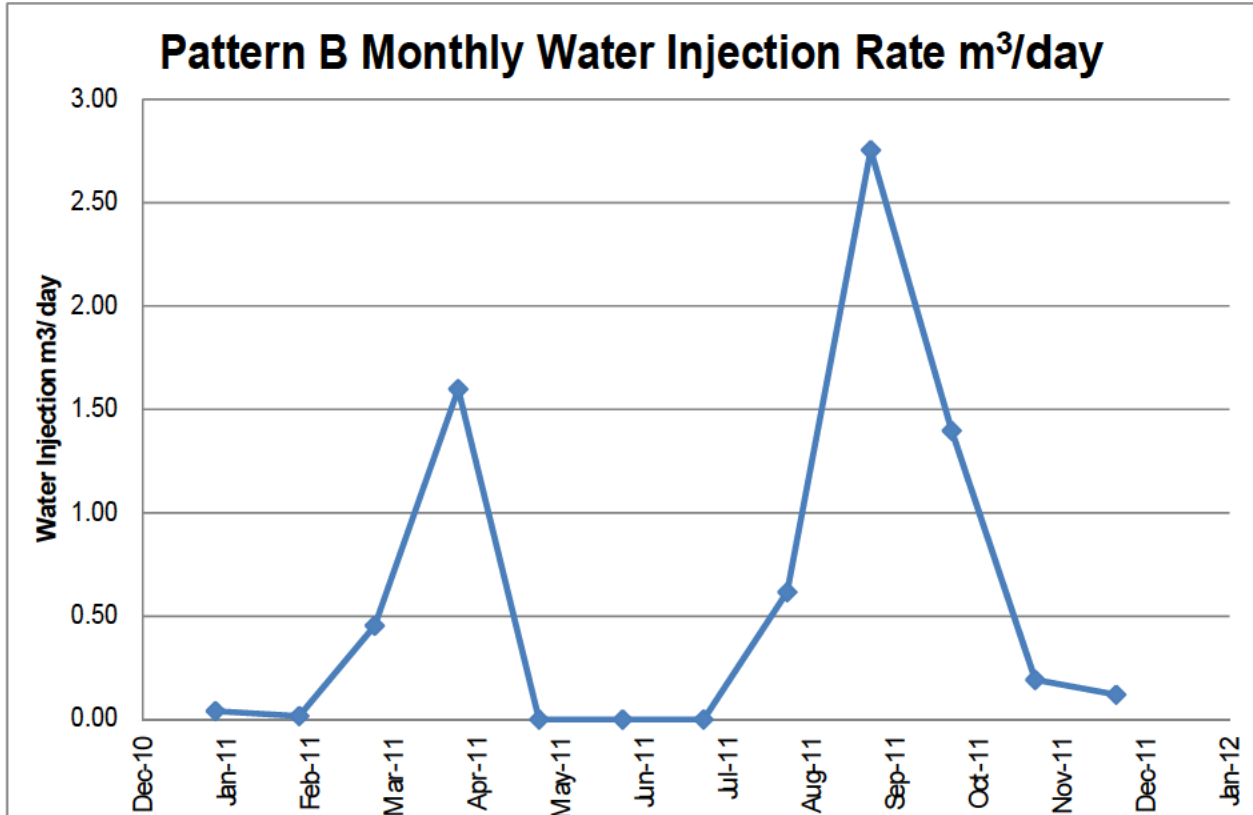
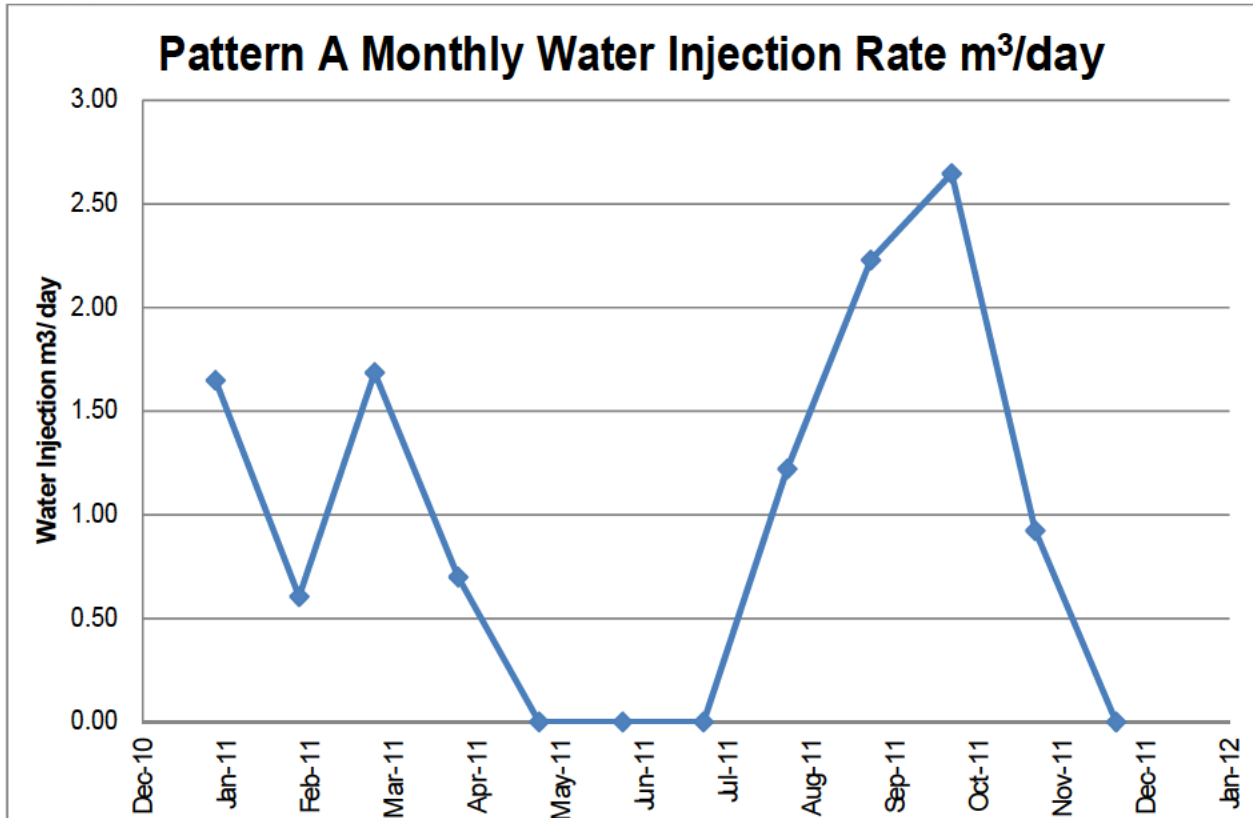


## A(ii): Monthly Water Injection Rate

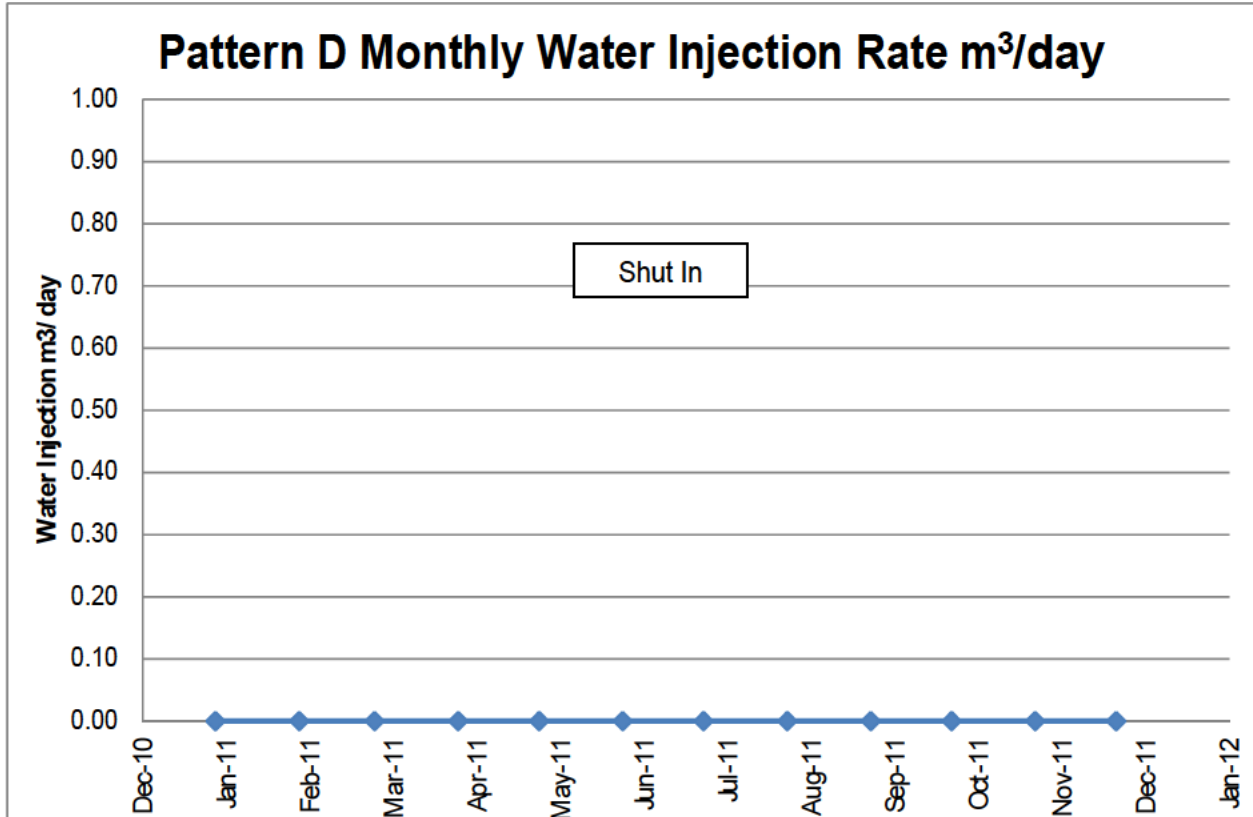
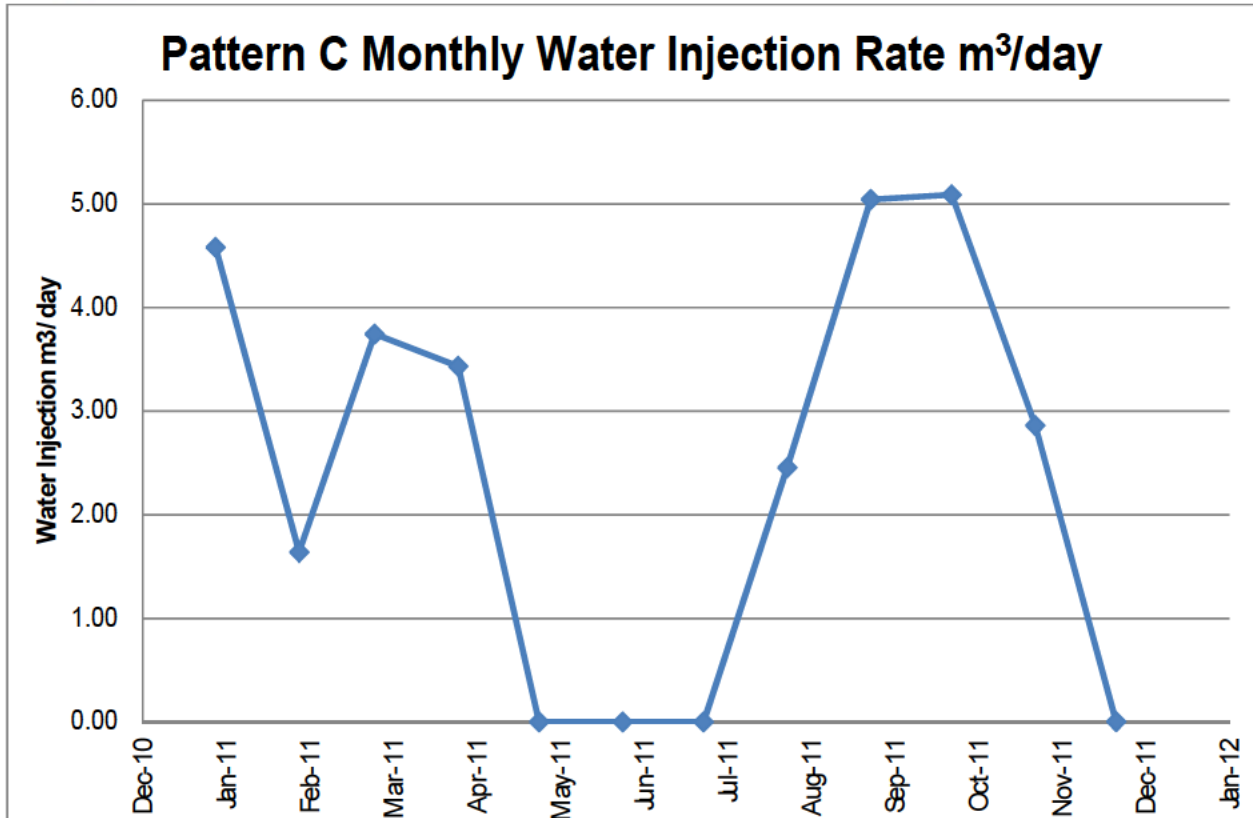
Monthly Water Injection Rate m <sup>3</sup> /day							
Date	TOTAL	Pattern A	Pattern B	Pattern C	Pattern D	Pattern E	Pattern F
Jan-11	13.77	1.65	0.04	4.58	0.00	0.02	3.74
Feb-11	4.96	0.61	0.02	1.64	0.00	0.02	1.34
Mar-11	13.12	1.69	0.45	3.74	0.00	1.69	2.77
Apr-11	12.09	0.70	1.60	3.43	0.00	1.50	2.43
May-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Jun-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Jul-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aug-11	8.84	1.22	0.62	2.46	0.00	1.00	1.78
Sep-11	19.53	2.23	2.75	5.04	0.00	2.29	3.61
Oct-11	18.40	2.65	1.40	5.09	0.00	1.85	3.70
Nov-11	9.02	0.92	0.19	2.86	0.00	0.32	2.36
Dec-11	5.54	0.00	0.12	0.00	0.00	0.84	2.29

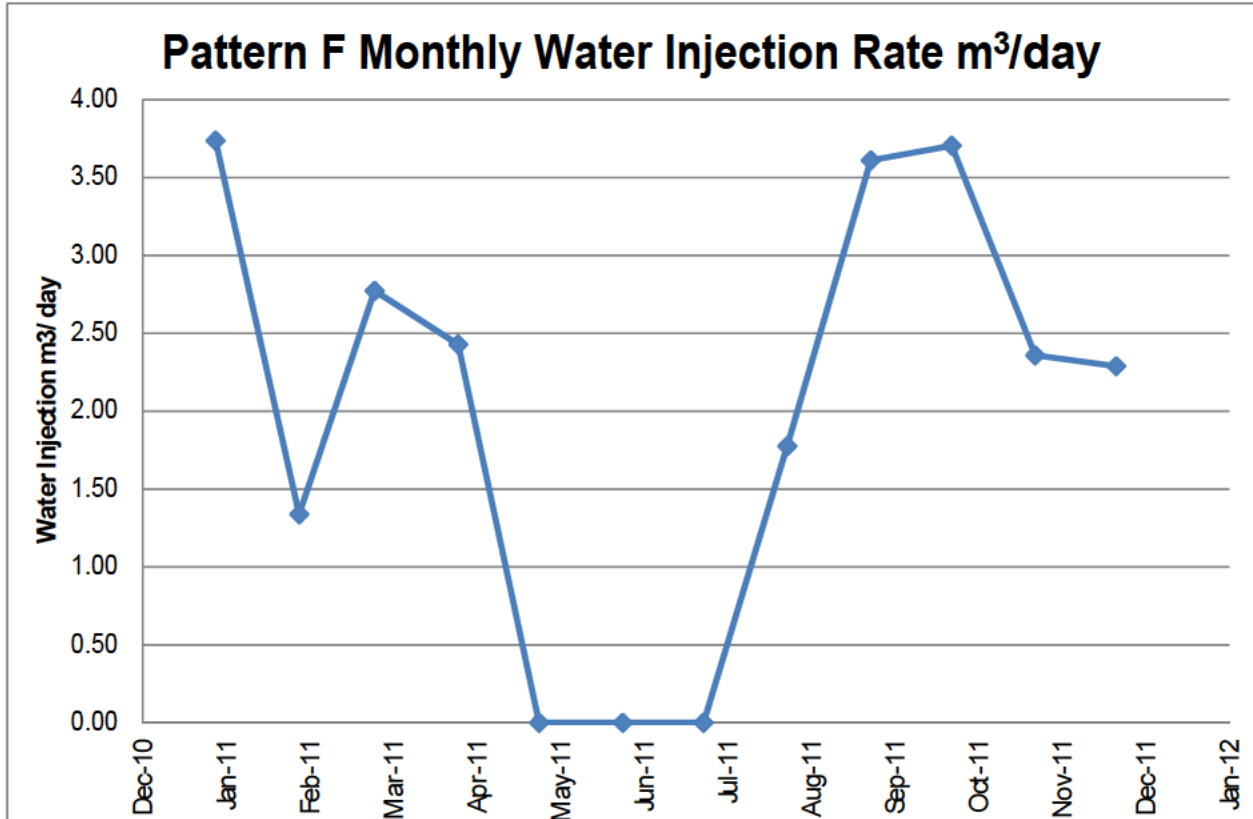
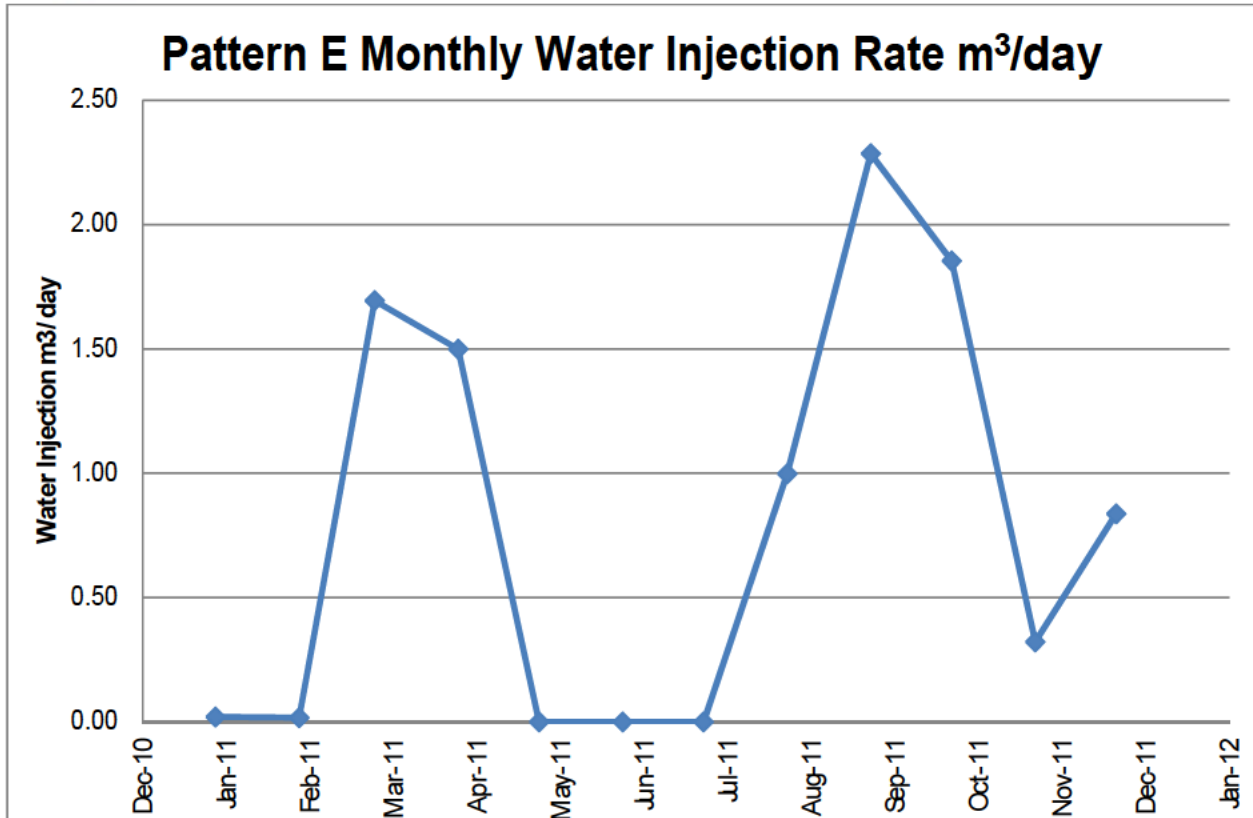
There was no water injection for the months of May, June and July due to flooding.





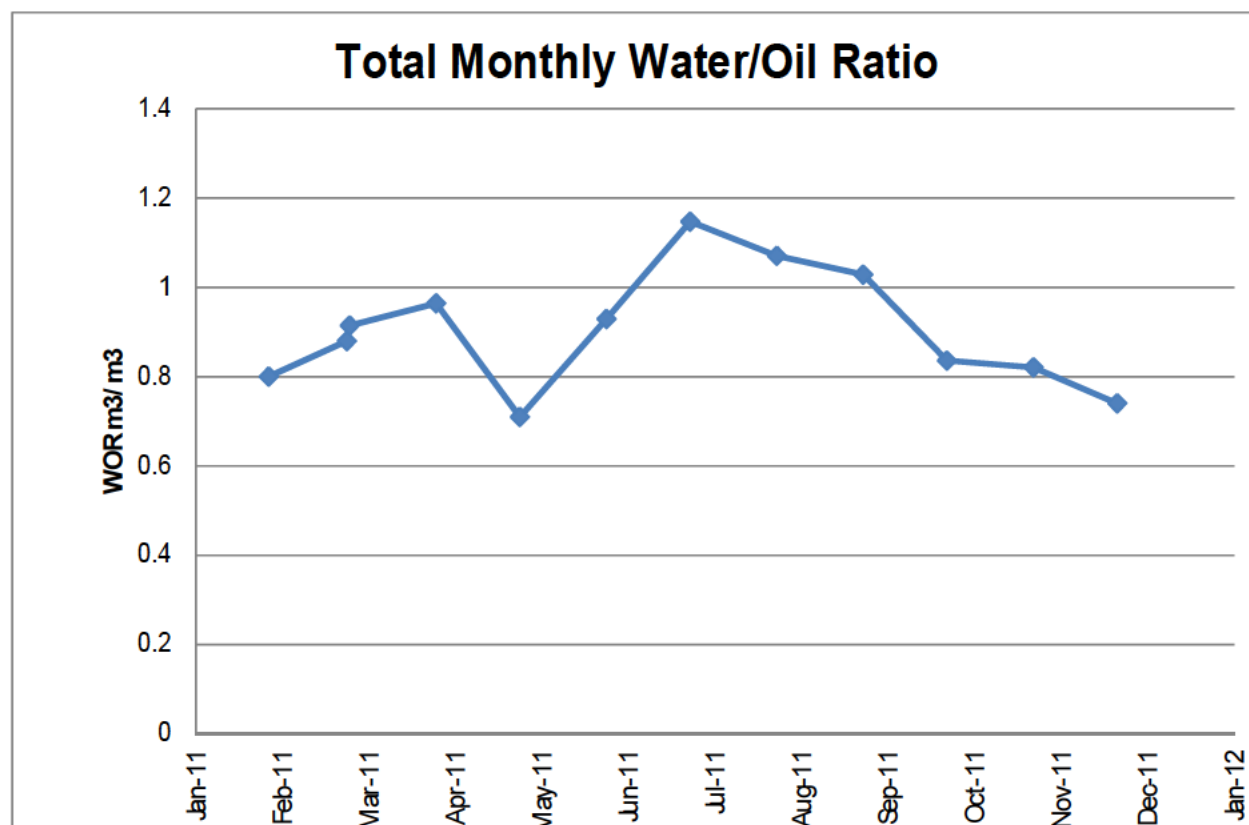




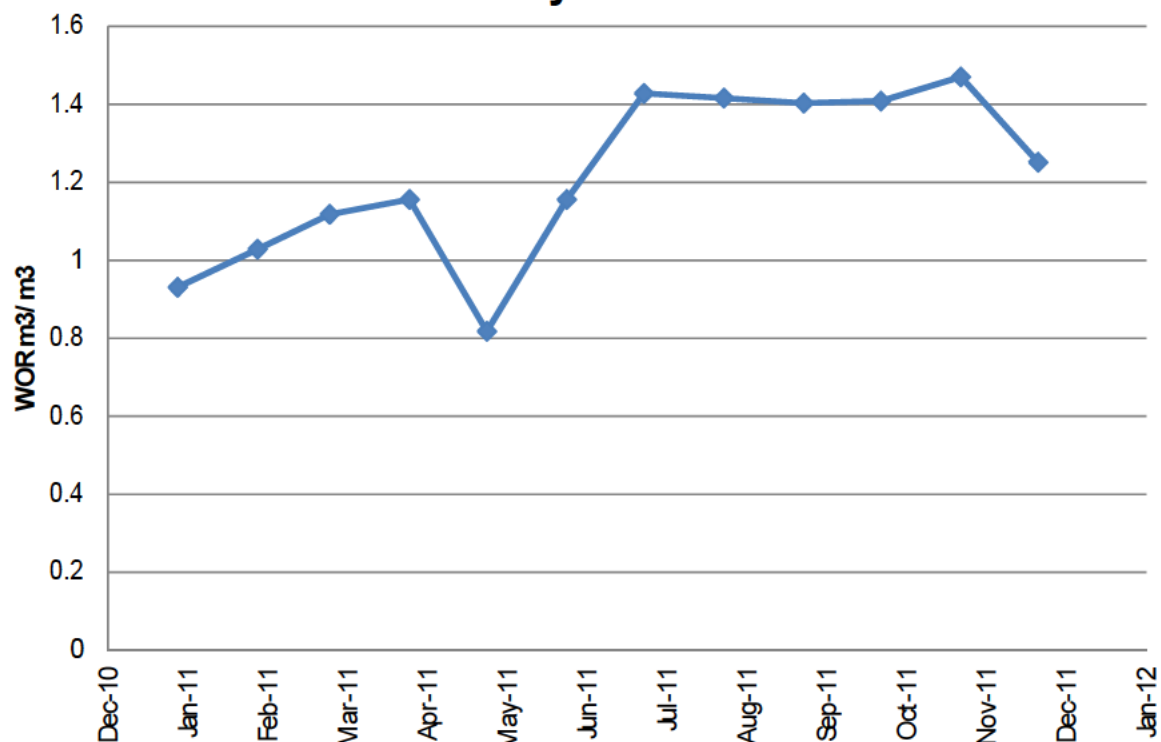


### A(iii): Monthly WOR

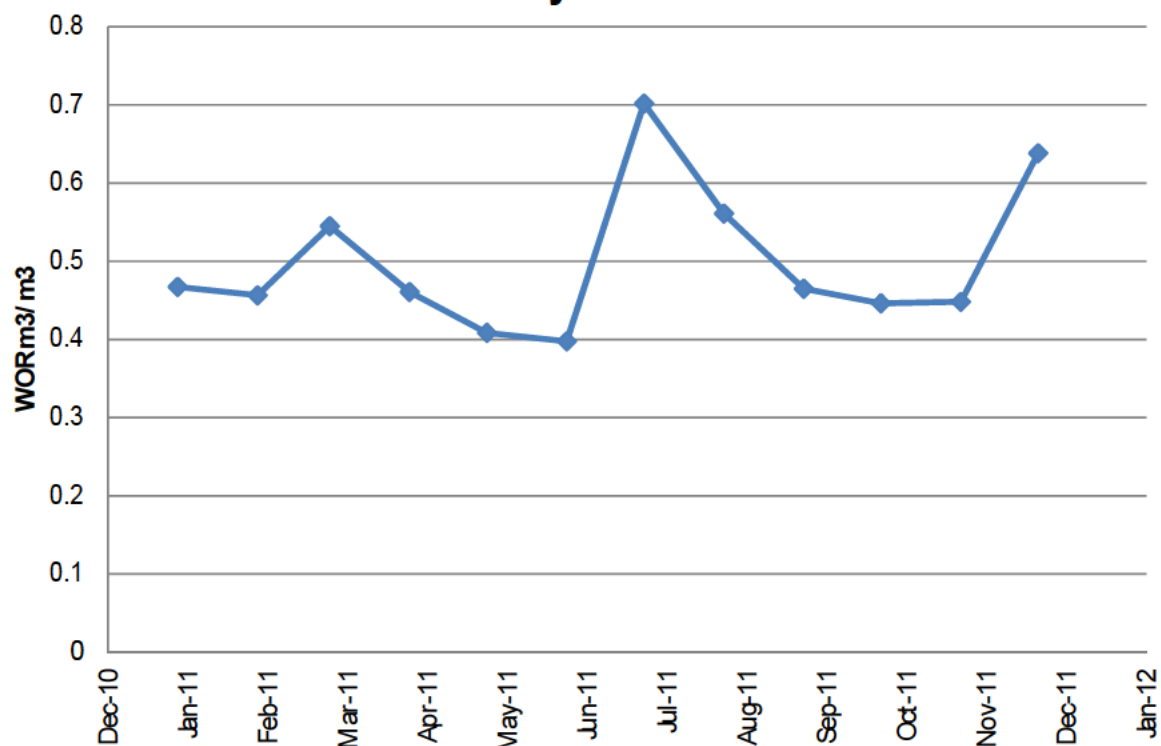
Monthly WOR							
Date	TOTAL	Pattern A	Pattern B	Pattern C	Pattern D	Pattern E	Pattern F
Jan-11	0.80	0.93	0.47	0.54	0.13	0.23	0.43
Feb-11	0.88	1.03	0.46	0.54	0.11	0.27	0.11
Mar-11	0.91	1.12	0.54	0.51	0.10	0.24	0.09
Apr-11	0.96	1.16	0.46	0.35	0.12	0.27	0.04
May-11	0.71	0.82	0.41	0.24	0.12	0.34	0.04
Jun-11	0.93	1.16	0.40	0.35	0.11	0.32	0.04
Jul-11	1.15	1.43	0.70	0.34	0.13	0.35	0.04
Aug-11	1.07	1.42	0.56	0.31	0.13	0.36	0.03
Sep-11	1.03	1.40	0.46	1.39	0.28	0.35	0.54
Oct-11	0.84	1.41	0.45	0.48	0.48	0.48	0.53
Nov-11	0.82	1.47	0.45	0.45	0.46	0.44	0.50
Dec-11	0.74	1.25	0.64	0.50	0.44	0.57	0.48



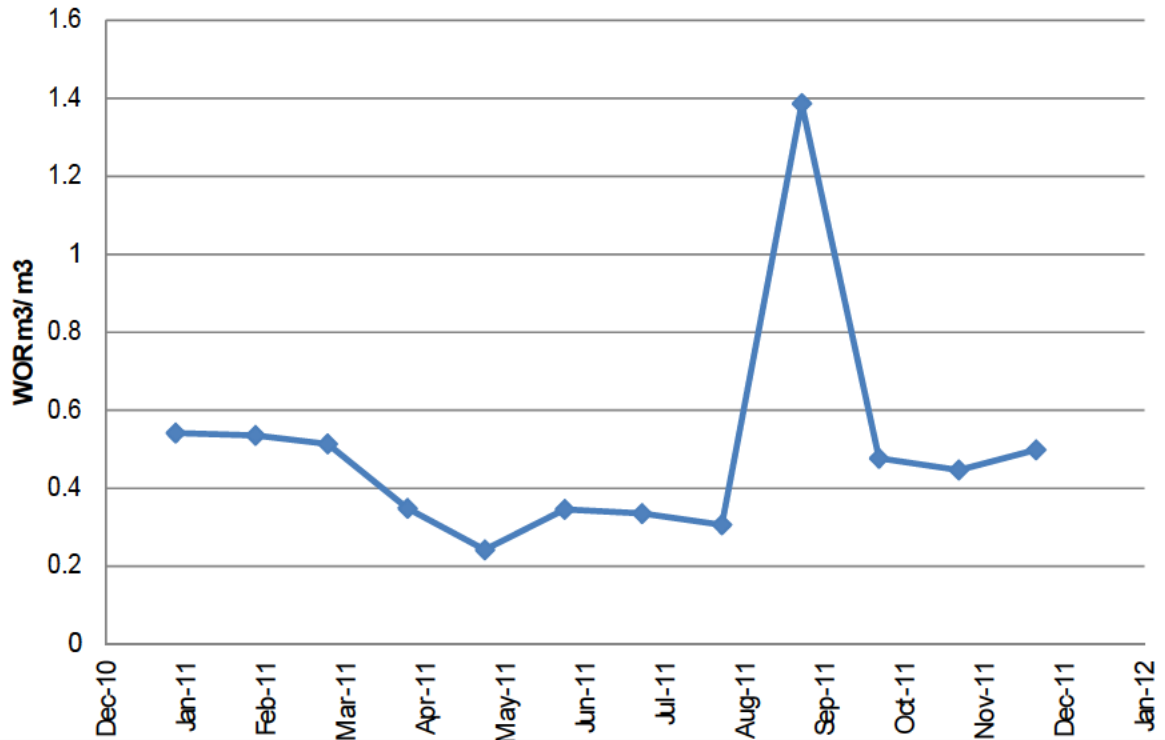
### Pattern A Monthly Water/Oil Ratio



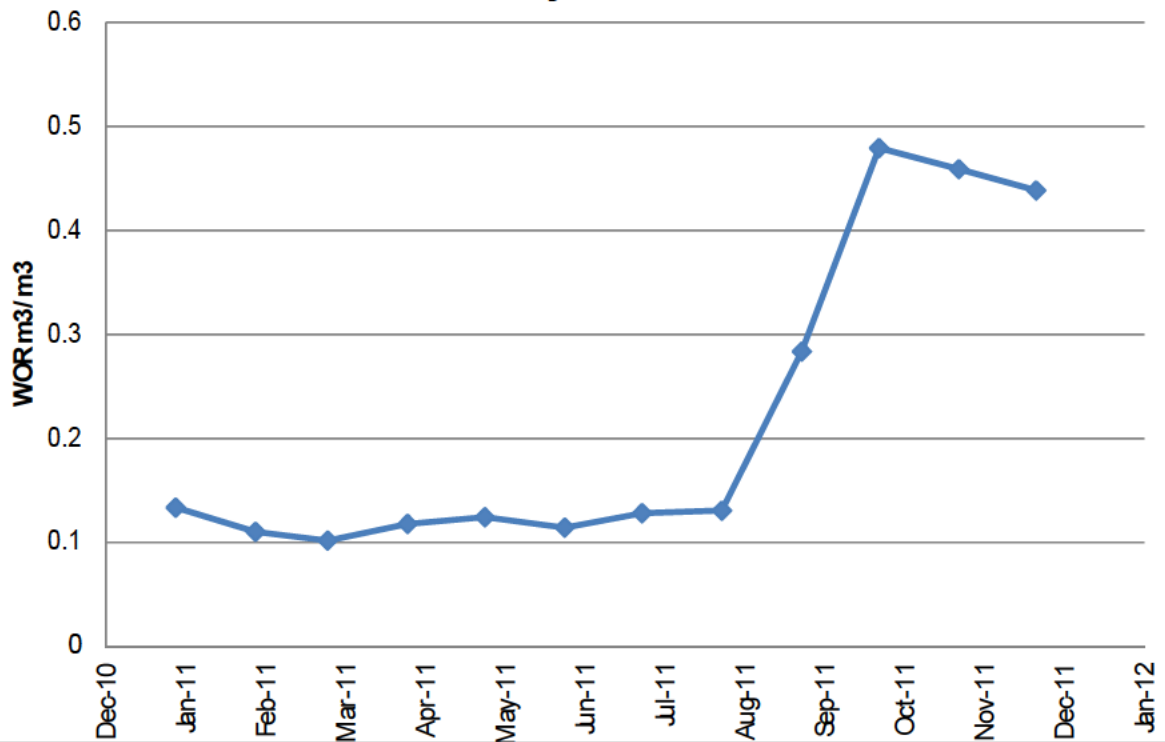
### Pattern B Monthly Water/Oil Ratio



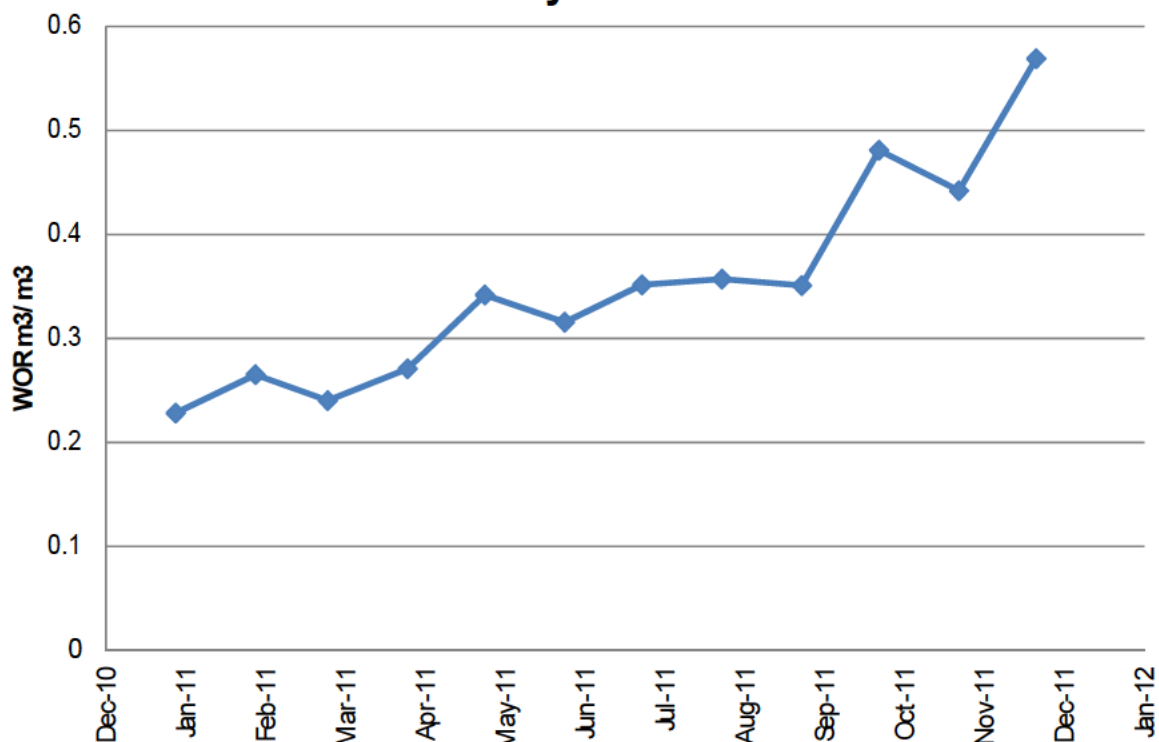
### Pattern C Monthly Water/Oil Ratio



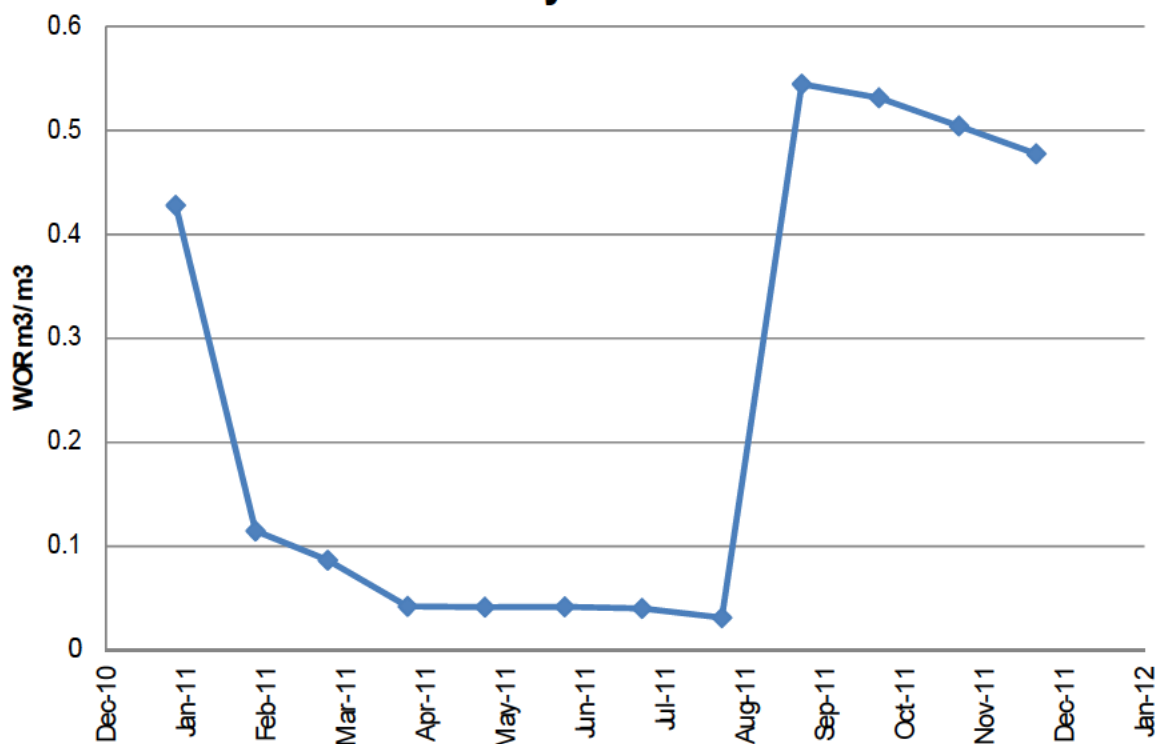
### Pattern D Monthly Water/Oil Ratio



**Pattern E Monthly Water/Oil Ratio**



**Pattern F Monthly Water/Oil Ratio**



## B: Cumulative Volume Summary

### Cumulative Oil Production

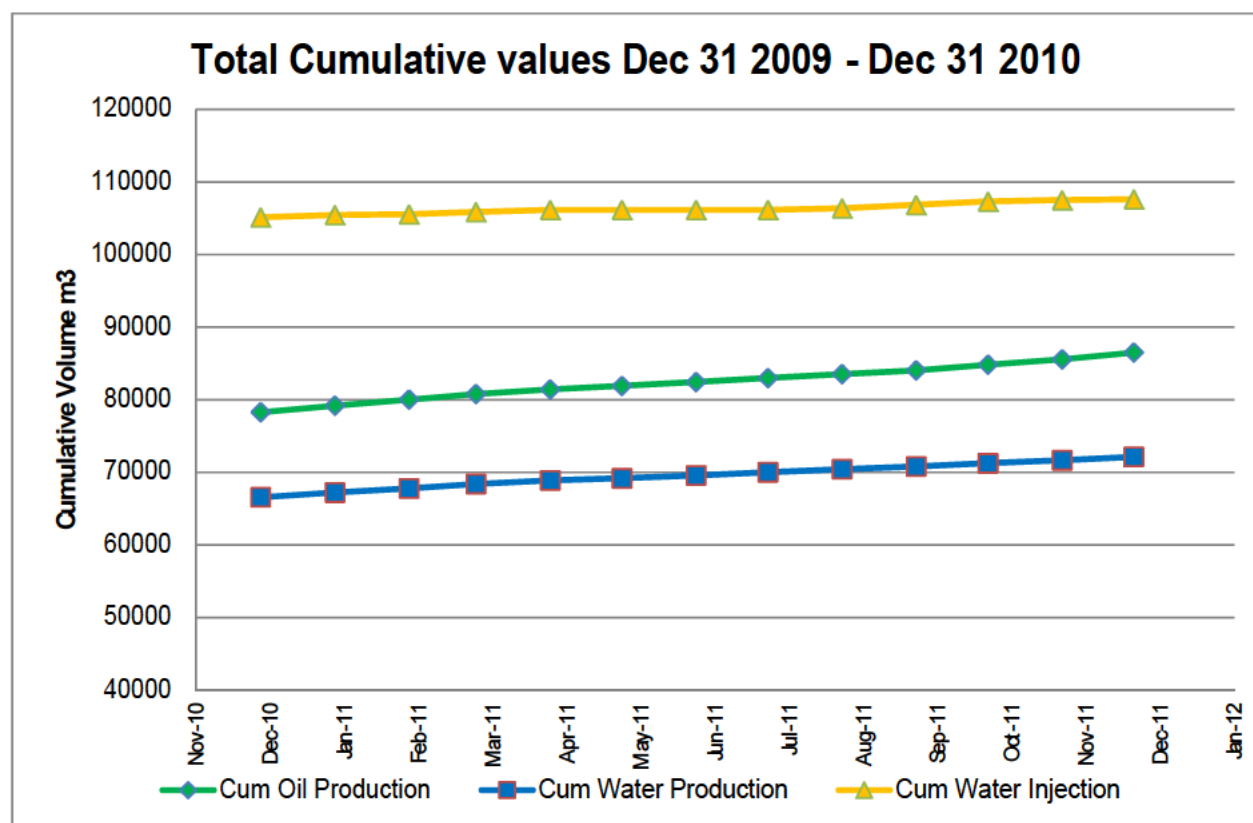
	<b>TOTAL</b>	<b>Pattern A</b>	<b>Pattern B</b>	<b>Pattern C</b>	<b>Pattern D</b>	<b>Pattern E</b>	<b>Pattern F</b>
<b>Cum Oil</b>	<b>m<sup>3</sup></b>	<b>m<sup>3</sup></b>	<b>m<sup>3</sup></b>	<b>m<sup>3</sup></b>	<b>m<sup>3</sup></b>	<b>m<sup>3</sup></b>	<b>m<sup>3</sup></b>
Dec-10	78287	14608	23634	9510	10935	14920	3895
Jan-11	79189	15330	23688	9570	10964	14948	3905
Feb-11	80028	15955	23757	9625	10995	14991	3920
Mar-11	80800	16548	23813	9679	11028	15012	3935
Apr-11	81422	17031	23851	9727	11054	15034	3942
May-11	81913	17411	23874	9768	11070	15058	3946
Jun-11	82436	17783	23917	9813	11096	15088	3953
Jul-11	82993	18155	24001	9858	11121	15115	3959
Aug-11	83531	18508	24081	9908	11147	15138	3964
Sep-11	84031	18822	24152	9962	11177	15160	3973
Oct-11	84830	19137	24214	10024	11327	15178	4135
Nov-11	85571	19401	24275	10079	11476	15197	4299
Dec-11	86506	19711	24395	10138	11650	15218	4491

### Cumulative Water Production

	<b>TOTAL</b>	<b>Pattern A</b>	<b>Pattern B</b>	<b>Pattern C</b>	<b>Pattern D</b>	<b>Pattern E</b>	<b>Pattern F</b>
<b>Cum Wtr</b>	<b>m<sup>3</sup></b>	<b>m<sup>3</sup></b>	<b>m<sup>3</sup></b>	<b>m<sup>3</sup></b>	<b>m<sup>3</sup></b>	<b>m<sup>3</sup></b>	<b>m<sup>3</sup></b>
Dec-10	66581	45122	9186	3003	3375	4583	1060
Jan-11	67227	45678	9228	3027	3384	4593	1065
Feb-11	67787	46183	9247	3049	3390	4600	1066
Mar-11	68404	46716	9292	3071	3395	4611	1068
Apr-11	68895	47149	9318	3091	3400	4617	1068
May-11	69192	47414	9328	3103	3404	4623	1068
Jun-11	69572	47746	9342	3122	3410	4632	1068
Jul-11	70009	48119	9372	3139	3415	4642	1069
Aug-11	70437	48464	9421	3158	3422	4652	1069
Sep-11	70811	48755	9458	3180	3433	4660	1074
Oct-11	71265	49049	9489	3198	3478	4668	1122
Nov-11	71664	49307	9514	3214	3519	4673	1168
Dec-11	72136	49569	9579	3232	3563	4682	1219

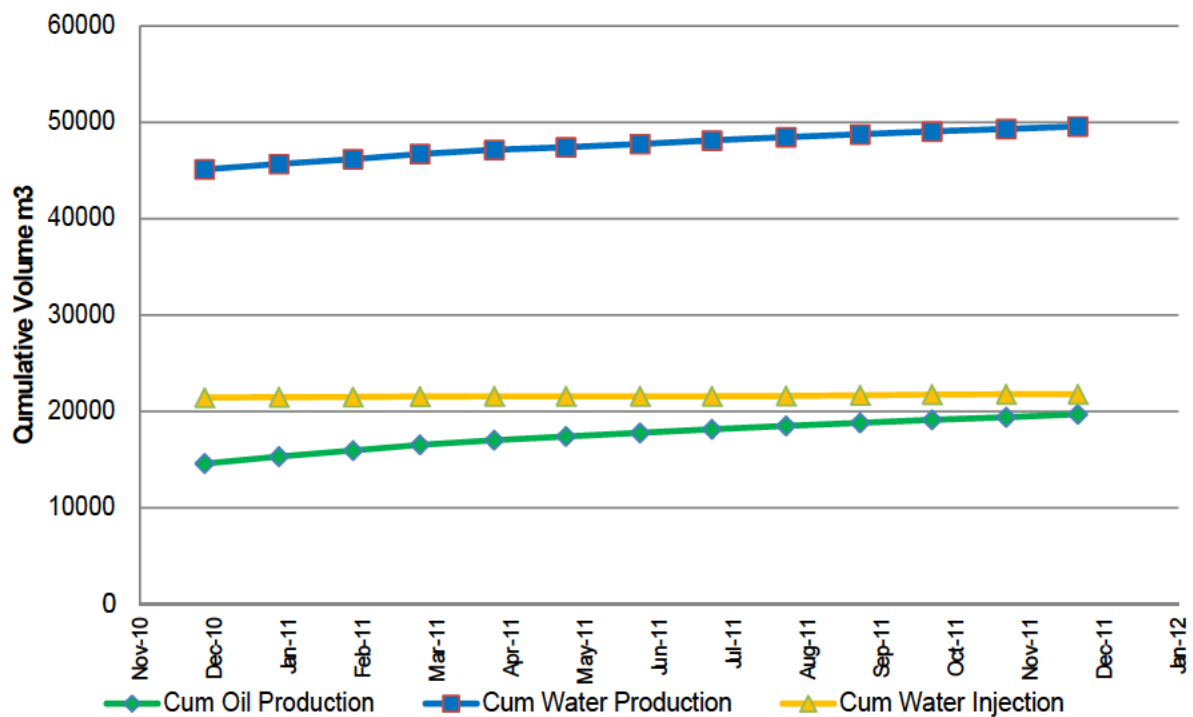
### Cumulative Water Injection

Cum Inj	TOTAL m <sup>3</sup>	Pattern A m <sup>3</sup>	Pattern B m <sup>3</sup>	Pattern C m <sup>3</sup>	Pattern D m <sup>3</sup>	Pattern E m <sup>3</sup>	Pattern F m <sup>3</sup>
Dec-10	105126	21433	23875	18025	24390	11229	6174
Jan-11	105437	21484	23876	18167	24390	11230	6289
Feb-11	105538	21501	23877	18213	24390	11230	6327
Mar-11	105859	21553	23891	18329	24390	11283	6413
Apr-11	106149	21574	23939	18432	24390	11328	6486
May-11	106149	21574	23939	18432	24390	11328	6486
Jun-11	106149	21574	23939	18432	24390	11328	6486
Jul-11	106149	21574	23939	18432	24390	11328	6486
Aug-11	106368	21612	23958	18509	24390	11359	6541
Sep-11	106846	21679	24041	18660	24390	11427	6649
Oct-11	107301	21761	24084	18818	24390	11485	6764
Nov-11	107501	21789	24090	18903	24390	11494	6835
Dec-11	107602	21789	24093	18904	24390	11520	6906

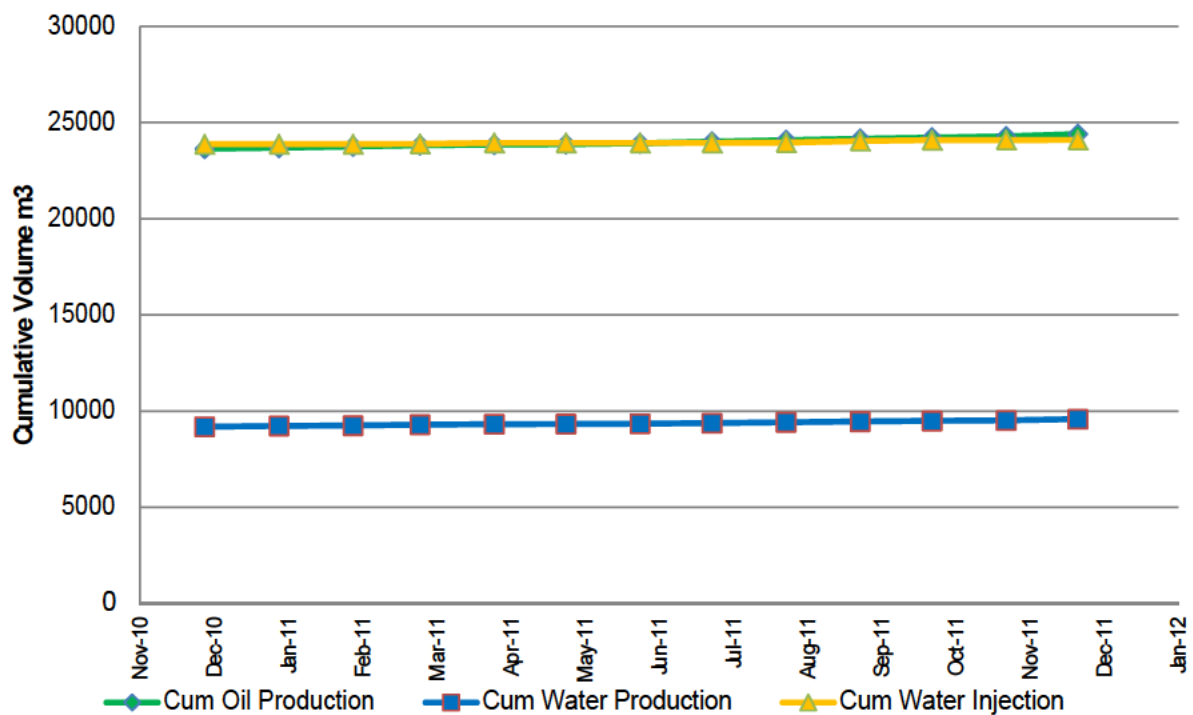




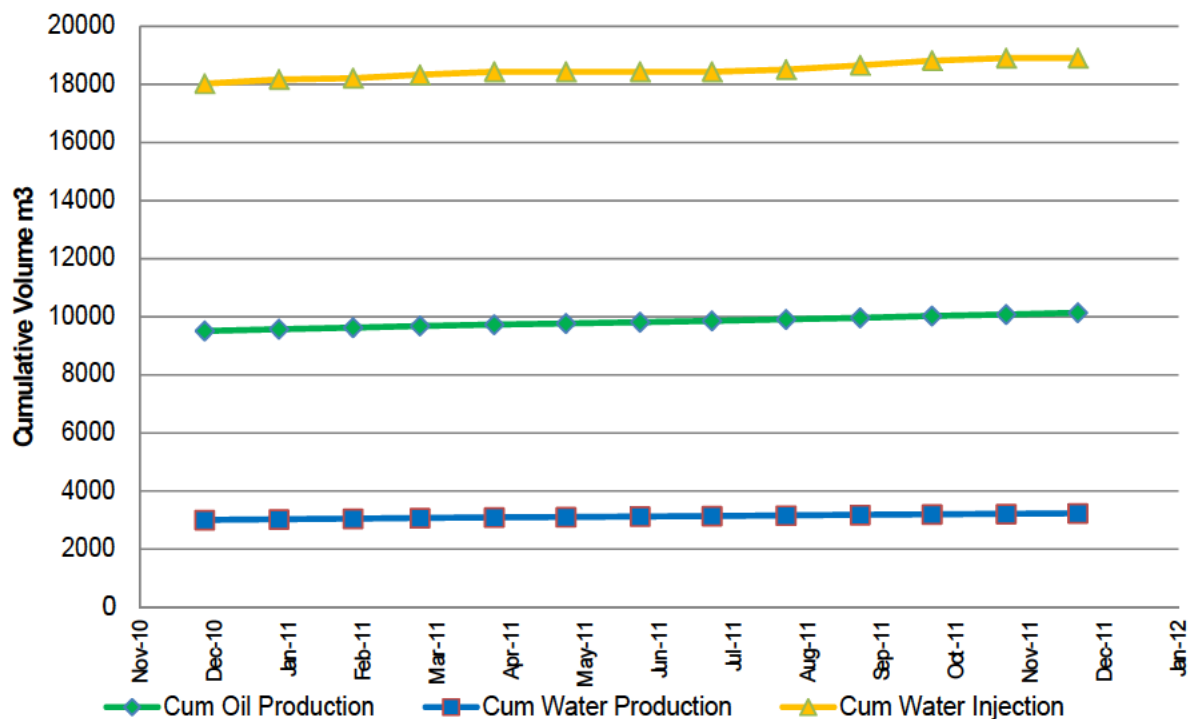
**Pattern A Cumulative values Dec 31 2010 - Dec 31 2011**



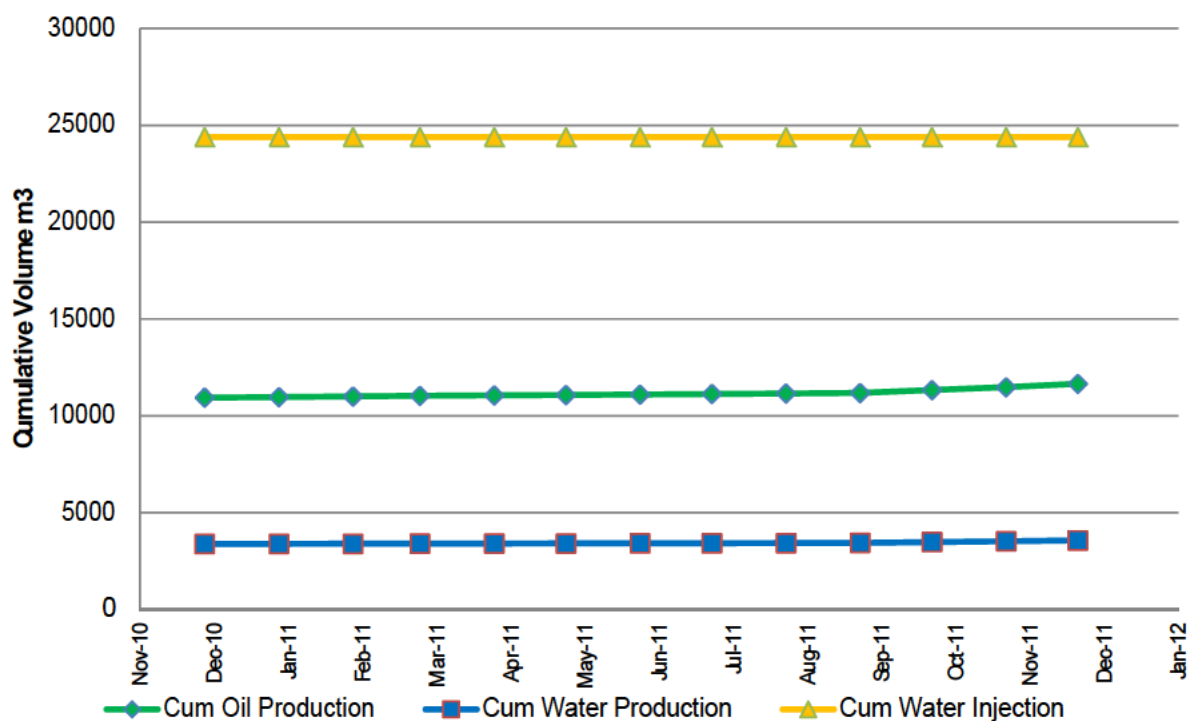
**Pattern B Cumulative values Dec 31 2010 - Dec 31 2011**



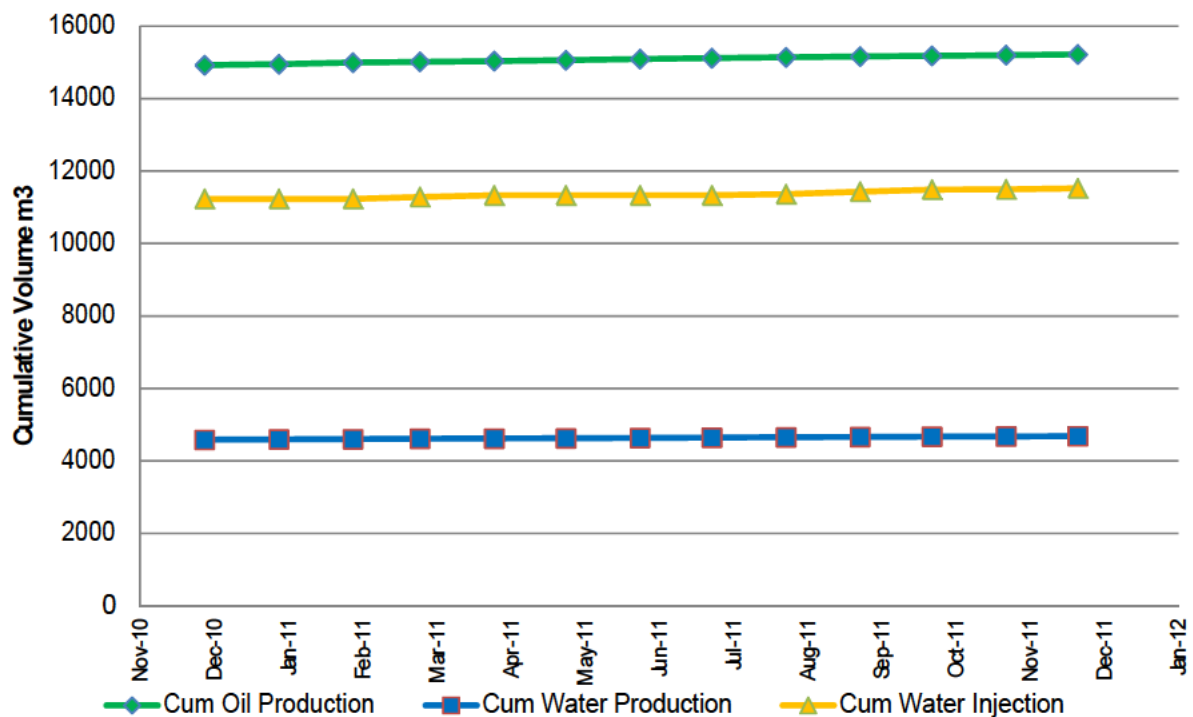
### Pattern C Cumulative values Dec 31 2010 - Dec 31 2011



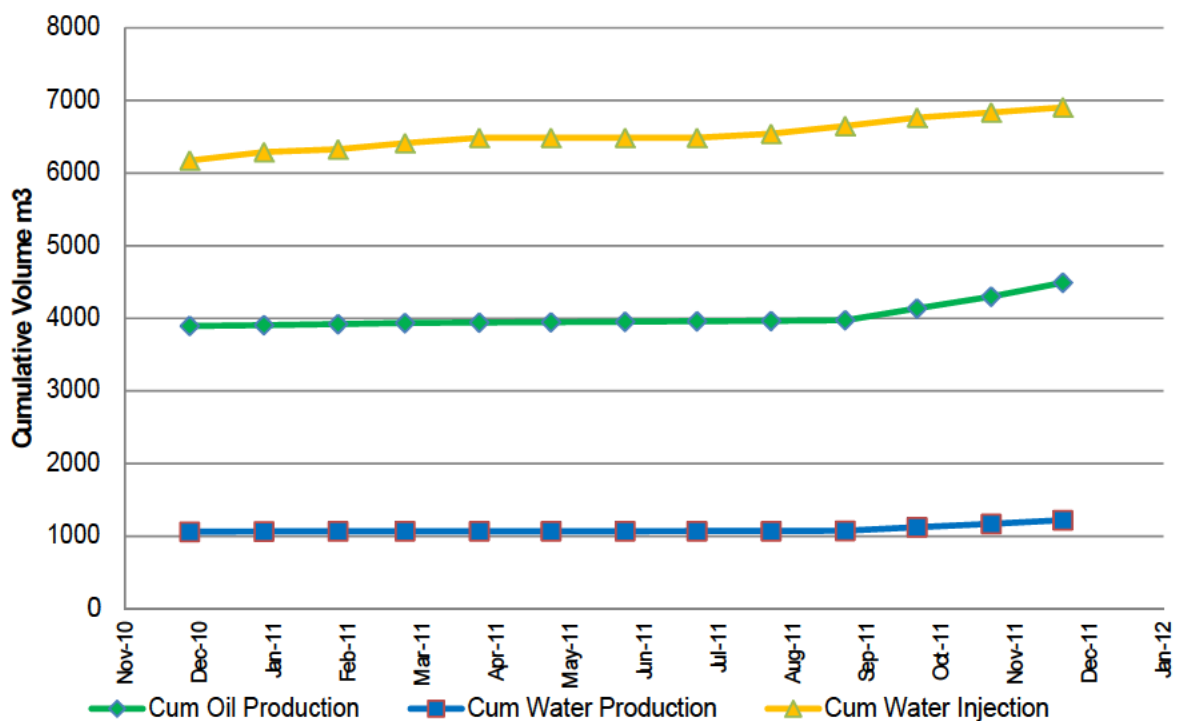
### Pattern D Cumulative values Dec 31 2010 - Dec 31 2011



**Pattern E Cumulative values Dec 31 2010 - Dec 31 2011**



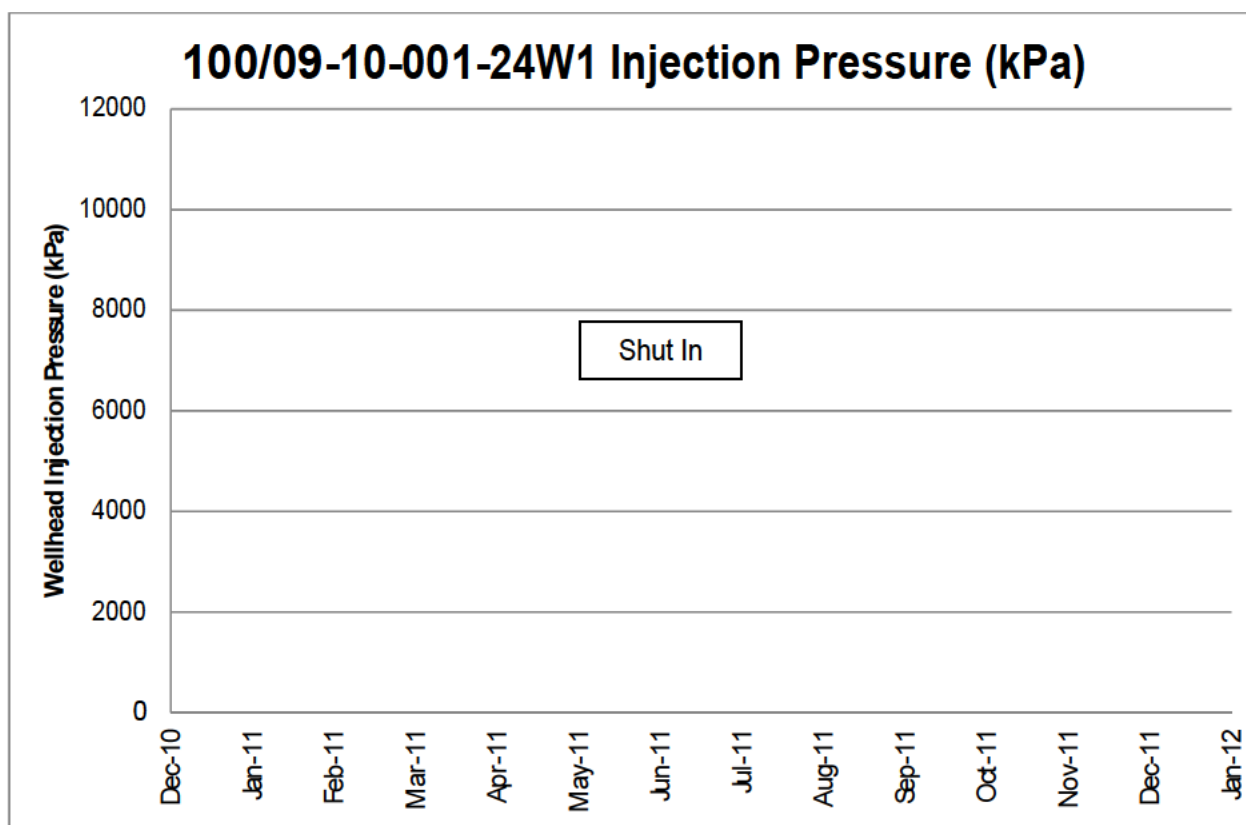
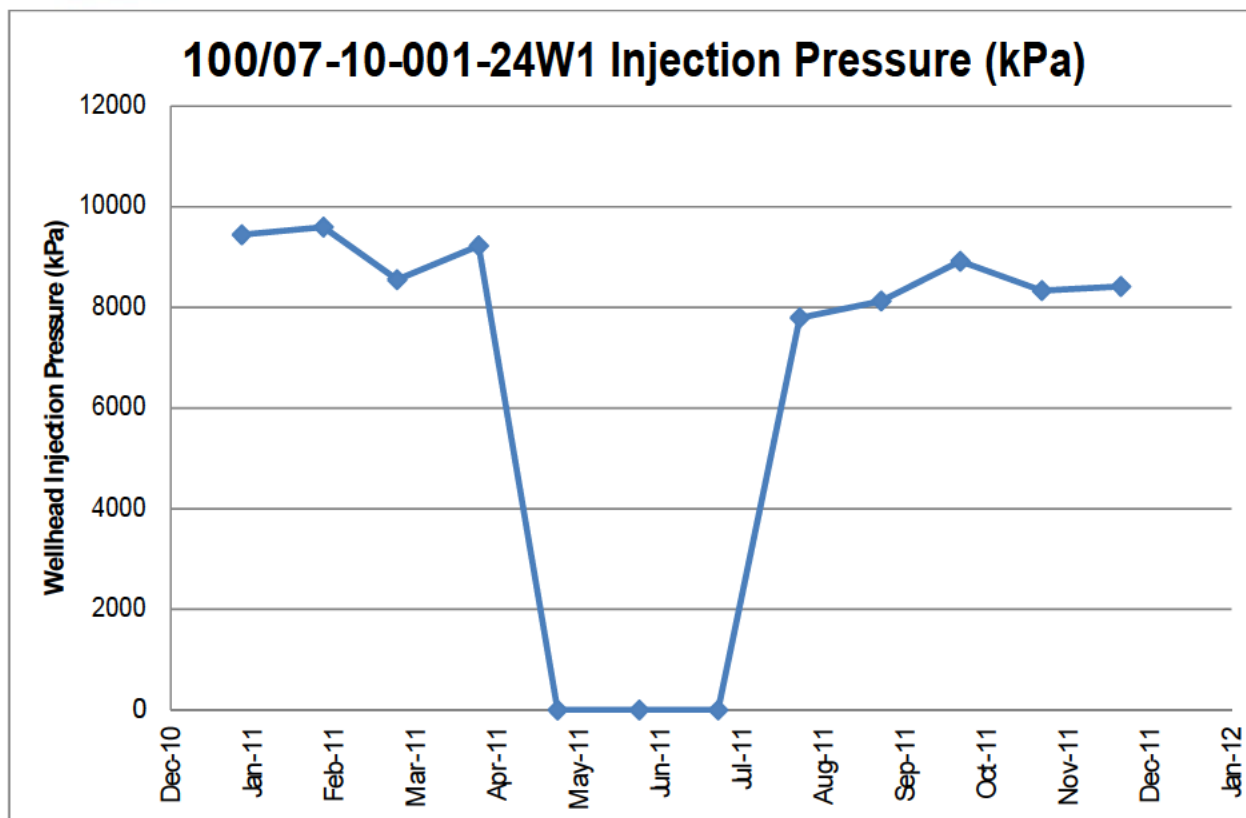
**Pattern F Cumulative values Dec 31 2010 - Dec 31 2011**

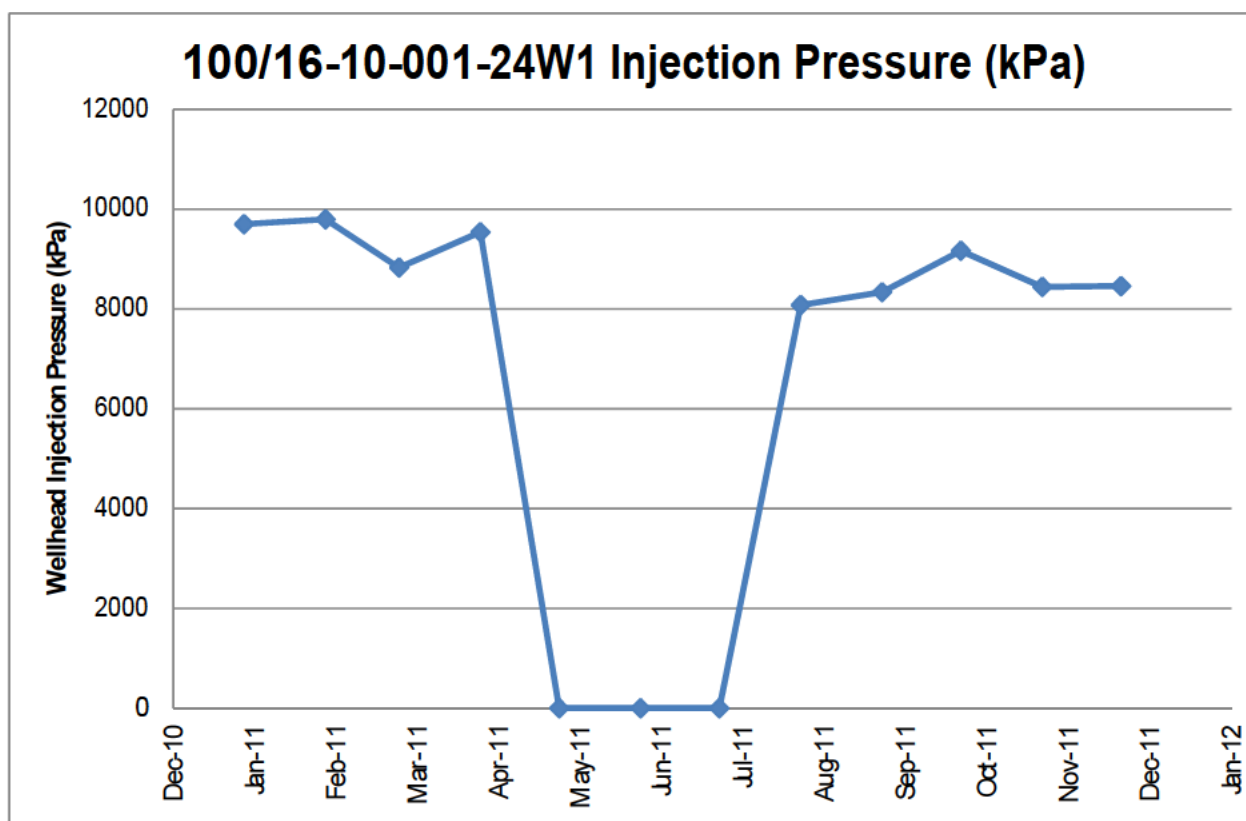
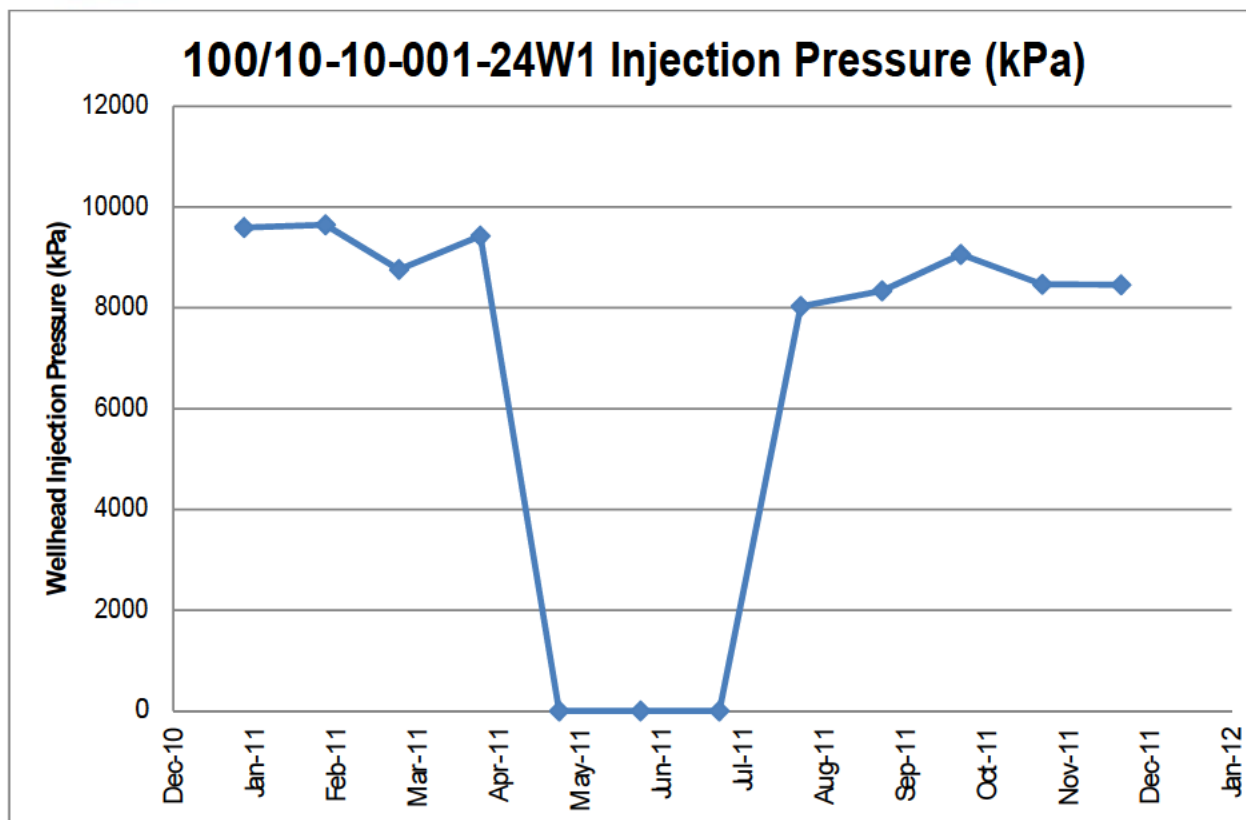


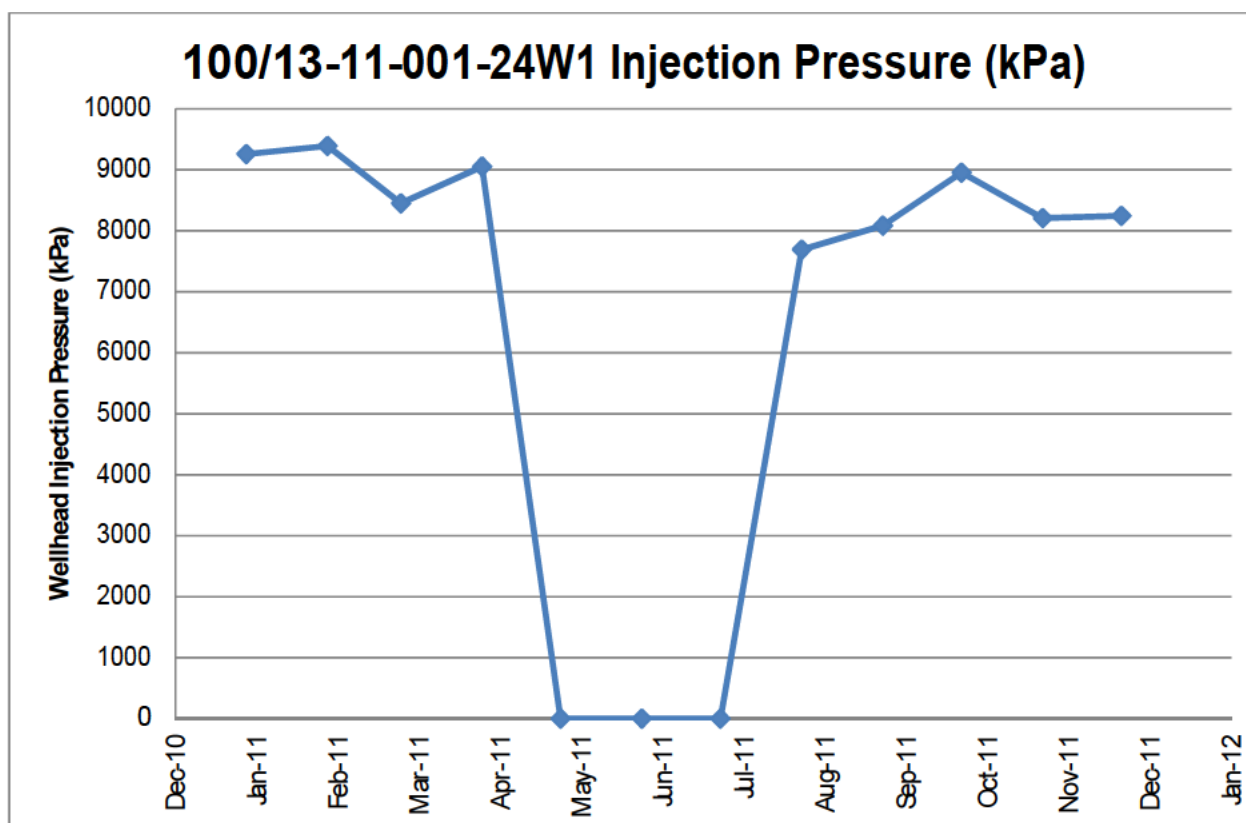
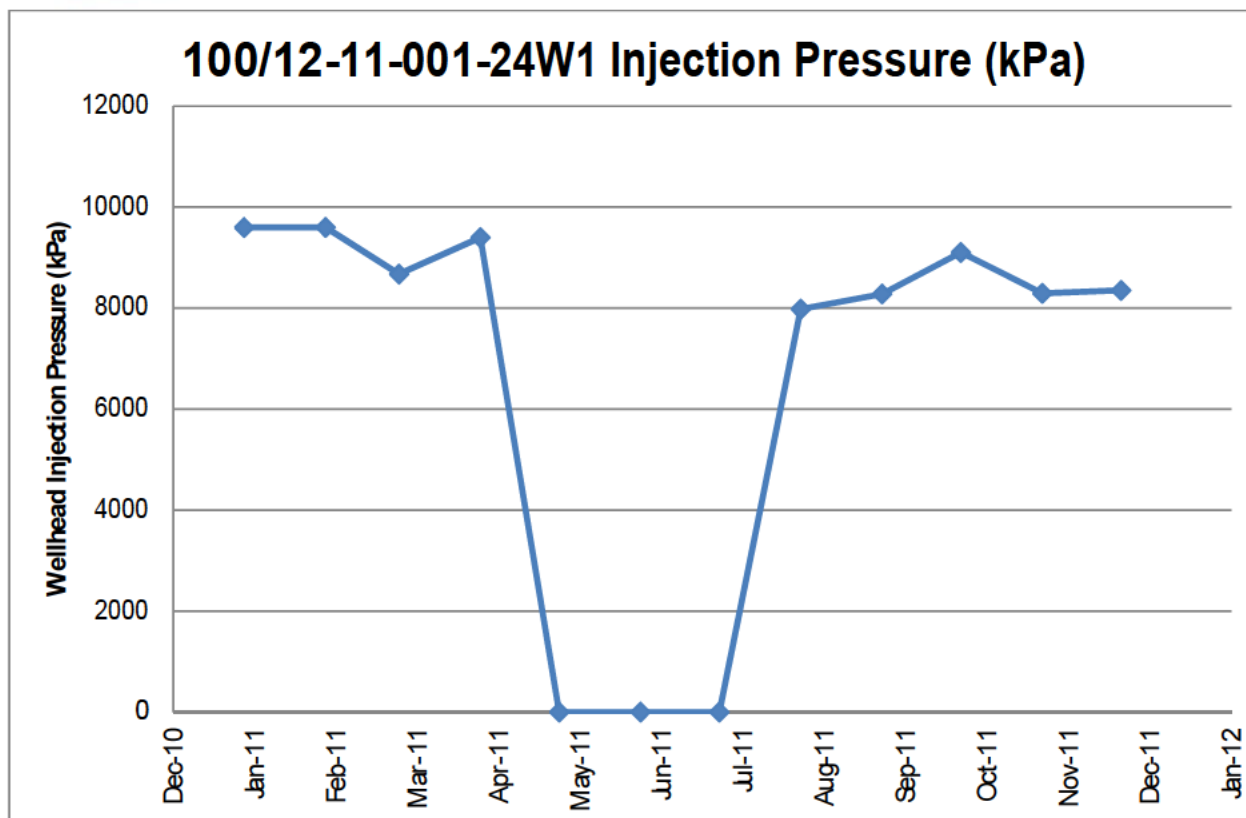
## C: Injection Pressure Summary

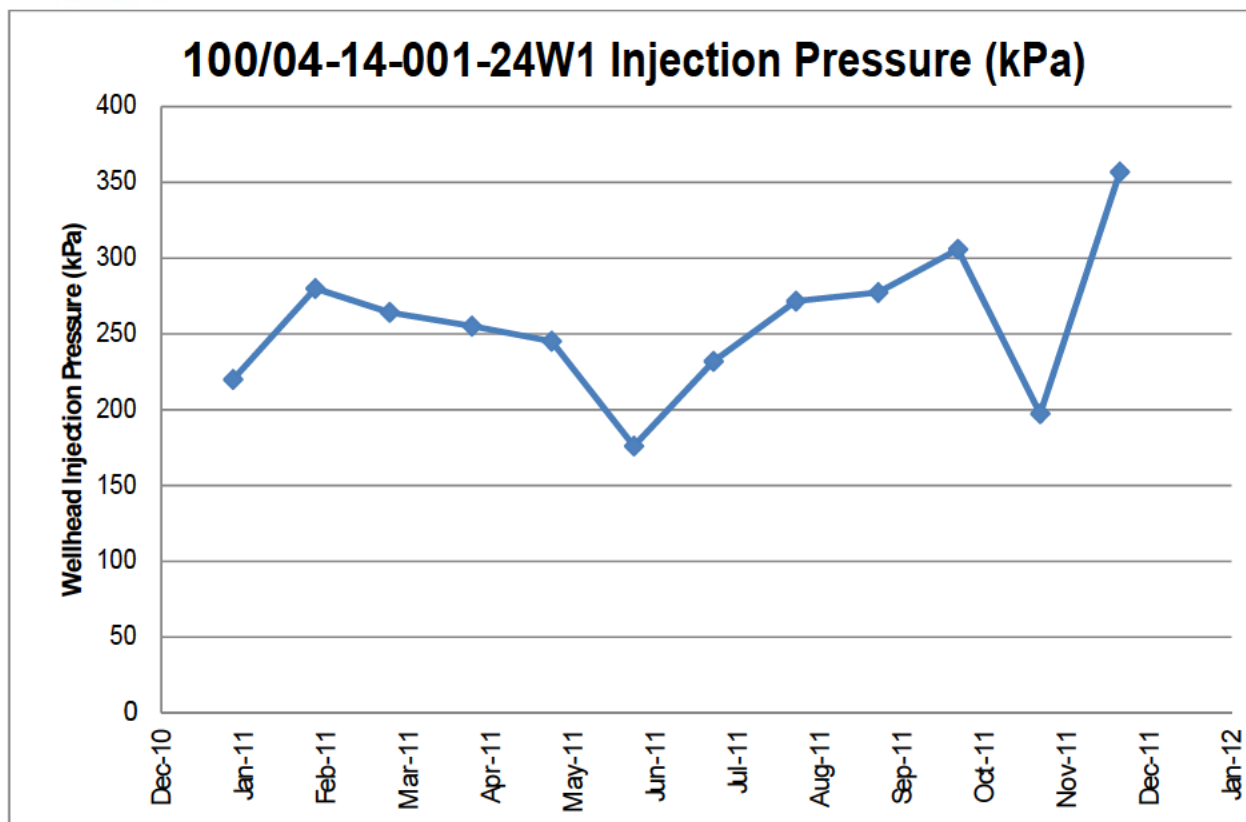
<b>INJECTION PRESURE (kPa) Production Trend</b>						
<b>From January 1 To December 31, 2011</b>						
	100/07-10-	100/09-10	100/10-10	100/16-10	100/12-11	100/13-11
Jan-11	9445		9594	9700	9597	9258
Feb-11	9596		9648	9796	9600	9393
Mar-11	8552		8761	8829	8674	8452
Apr-11	9223		9427	9538	9397	9053
May-11	SI		SI	SI	SI	SI
Jun-11	SI		SI	SI	SI	SI
Jul-11	SI		SI	SI	SI	SI
Aug-11	7792		8029	8077	7981	7692
Sep-11	8126		8337	8337	8280	8087
Oct-11	8916		9061	9166	9102	8955
Nov-11	8333		8467	8440	8292	8208
Dec-11	8416		8458	8458	8350	8245

The consistent pressure drops between all the wells, is due to the entire injection system being shut down due to flooding.









## D: 2011 Reservoir Pressures

There were no reservoir pressures taken within the scope of this review for the year.

ARC is planning to gather pressure information in 2012 to further evaluate the effectiveness of the waterflood.

## E: 2011 Well Servicing Summary

Date	UWI	Comments
19-Jan-2011	00/08-10-001-24W1M	Waxed in; hot oil
16-Sep-2011	0C/08-10-001-24W1M	Parted Rods



## F: Voidage Replacement Ratio Calculations

Monthly VRR							
Date	Total	Pattern A	Pattern B	Pattern C	Pattern D	Pattern E	Pattern F
1/1/2011	0.23	0.03	0.01	1.43	0.00	0.01	14.61
2/1/2011	0.09	0.01	0.01	0.51	0.00	0.01	4.04
3/1/2011	0.24	0.04	0.10	1.31	0.00	0.89	9.81
4/1/2011	0.27	0.02	0.54	1.49	0.00	1.53	17.85
5/1/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/1/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/1/2011	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/1/2011	0.23	0.04	0.13	1.07	0.00	0.78	19.60
9/1/2011	0.54	0.08	0.66	1.12	0.00	2.11	13.99
10/1/2011	0.36	0.10	0.39	1.61	0.00	0.70	0.87
11/1/2011	0.19	0.04	0.07	1.01	0.00	0.13	0.54
12/1/2011	0.10	0.00	0.01	0.00	0.00	0.17	0.47
<b>Project Cumm. VRR</b>	<b>0.55</b>	<b>0.20</b>	<b>0.66</b>	<b>1.31</b>	<b>1.48</b>	<b>0.54</b>	<b>1.12</b>

## G: Quality Control and Treatment of the Injected Fluid

The current quality and treatment control for the injection water at Goodlands begins with a two phase filtering process. Each filter lasts over 1 month.

Phase 1: Fluid is filtered down to 10 microns.

Phase 2: Fluid is further filtered to 5 microns.

The operators monitor the water tanks to ensure there is no oil carryover. In the event that oil is noticed on top of the water, the tanks will be skimmed to ensure that the oil is not re-injected through the water injection wells.

Please see the attached Schematic for further details and specifications on the Injection system in place.

## H: Unusual Performance Problems and Remedial Measures

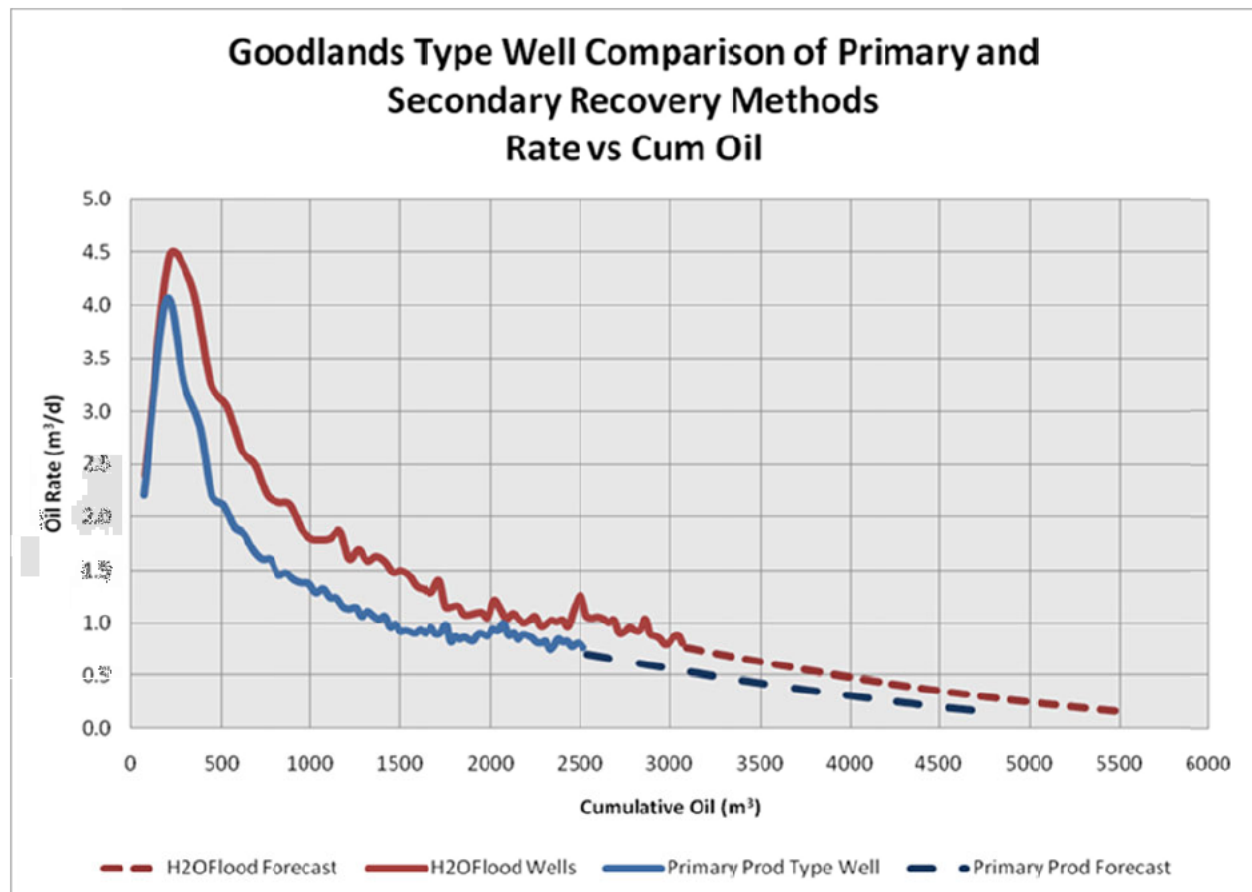
Due to the injection pressure constraints, the existing injection pump is now oversized. Currently the pump cycles on and off to avoid injection pressures over 10,000 kPa. The pump cycling

allows the high pressures to bleed off and decrease injection pressures . These systematic shut downs have increased in frequency to every few days and remains shut down for progressively longer periods of time.

The water injection rates for each of the p patterns are declining. Consistent injection rates cannot be maintained because of high injection pressures .

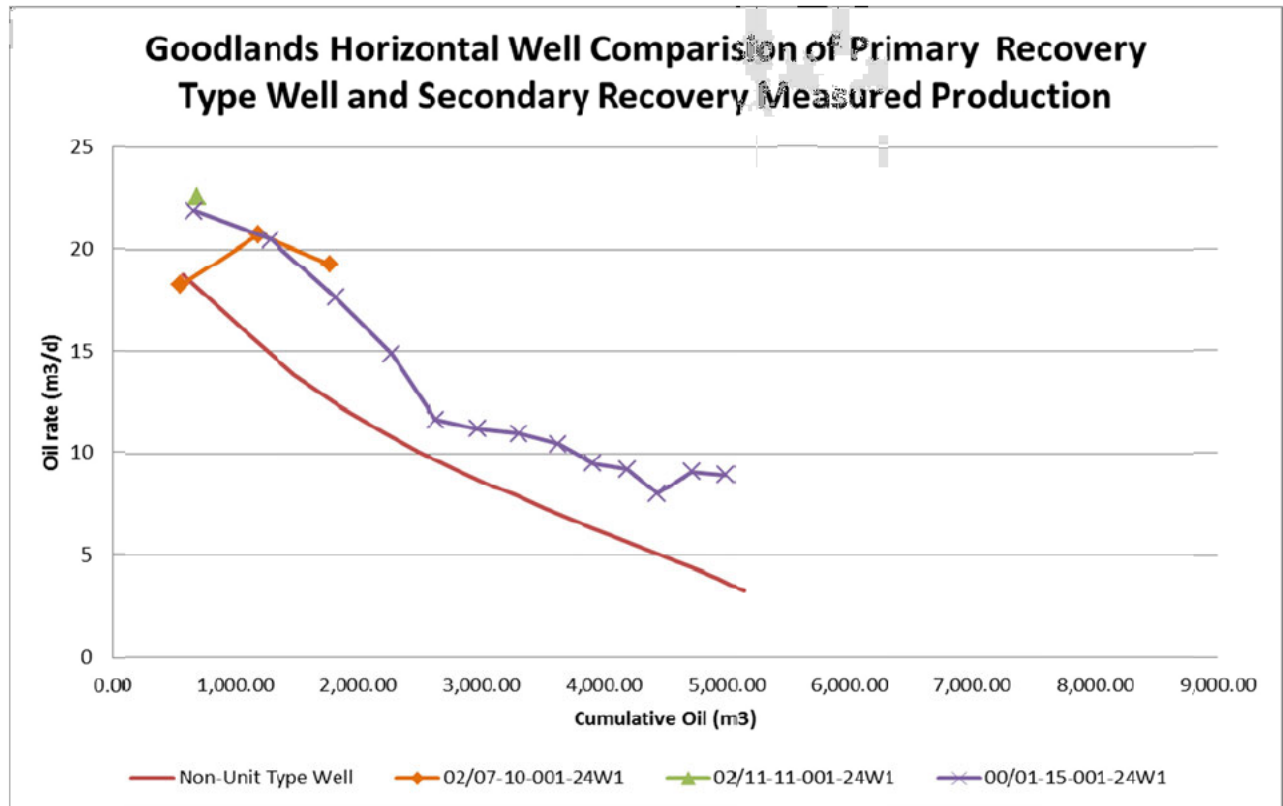
## I: Original Project Expectations

Before implementing the waterflood, Tundra Oil and Gas did a reservoir simulation study to estimate the effect of secondary recovery in the Amaranth. It was estimated that vertical wells under waterflood would have 1.5-2.0x the recovery of primary operated vertical wells. It has been determined that this, in fact, has not occurred. A graph comparing the average producing verticals with and without pressure support is shown below.

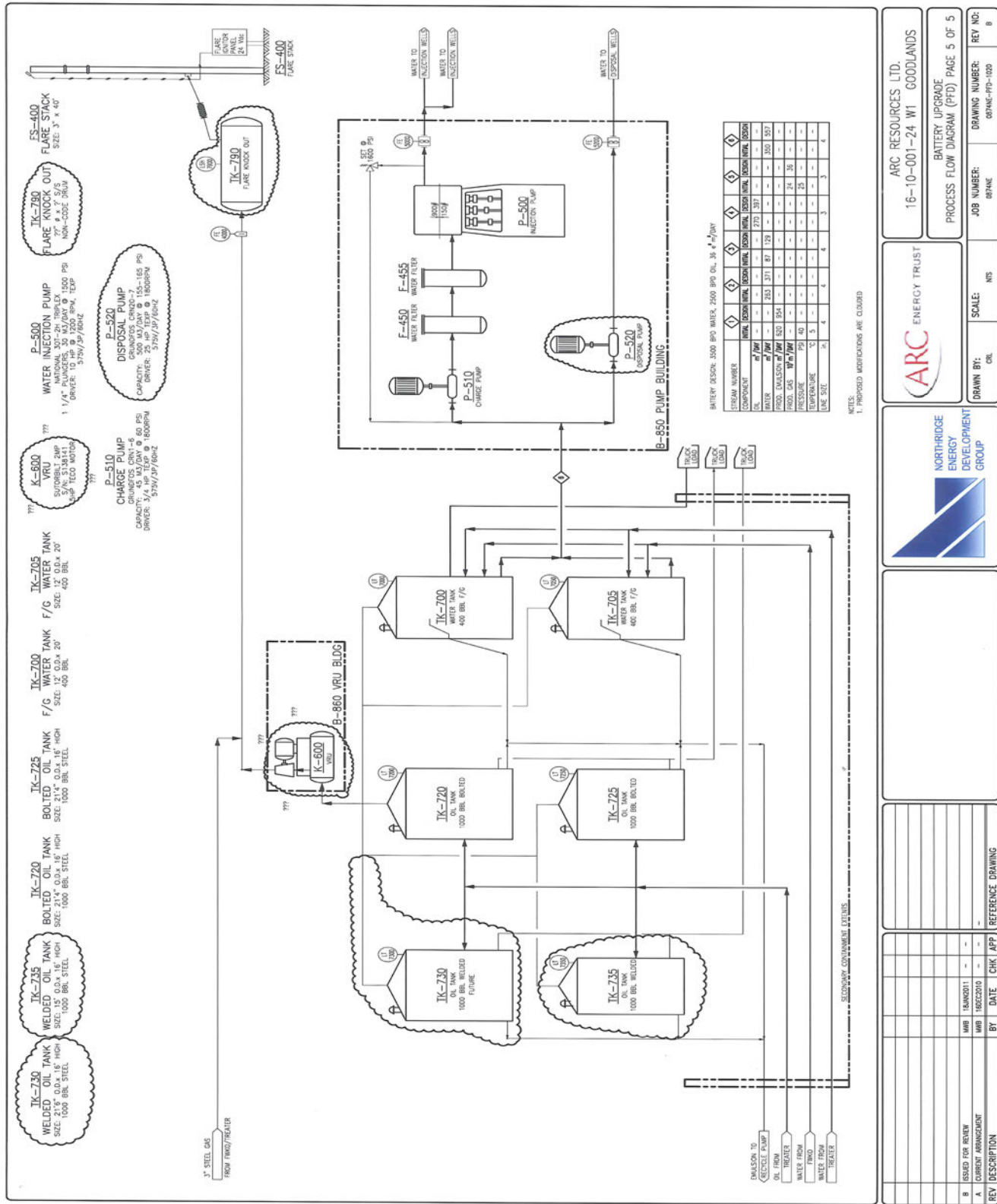


This graph shows the ratio of Secondary to Primary production for ultimate recovery is only 1.2. This result does not meet the original forecast for the recovery of the Project under waterflood.

A normalized Type Well comparison of the new horizontal wells was conducted. While there is insufficient data to draw conclusive results, initial indications are that horizontal wells within the Project area outperform equivalent wells under primary production (see graph below).



# ATTACHMENT 1: Schematic of the Injection Facilities



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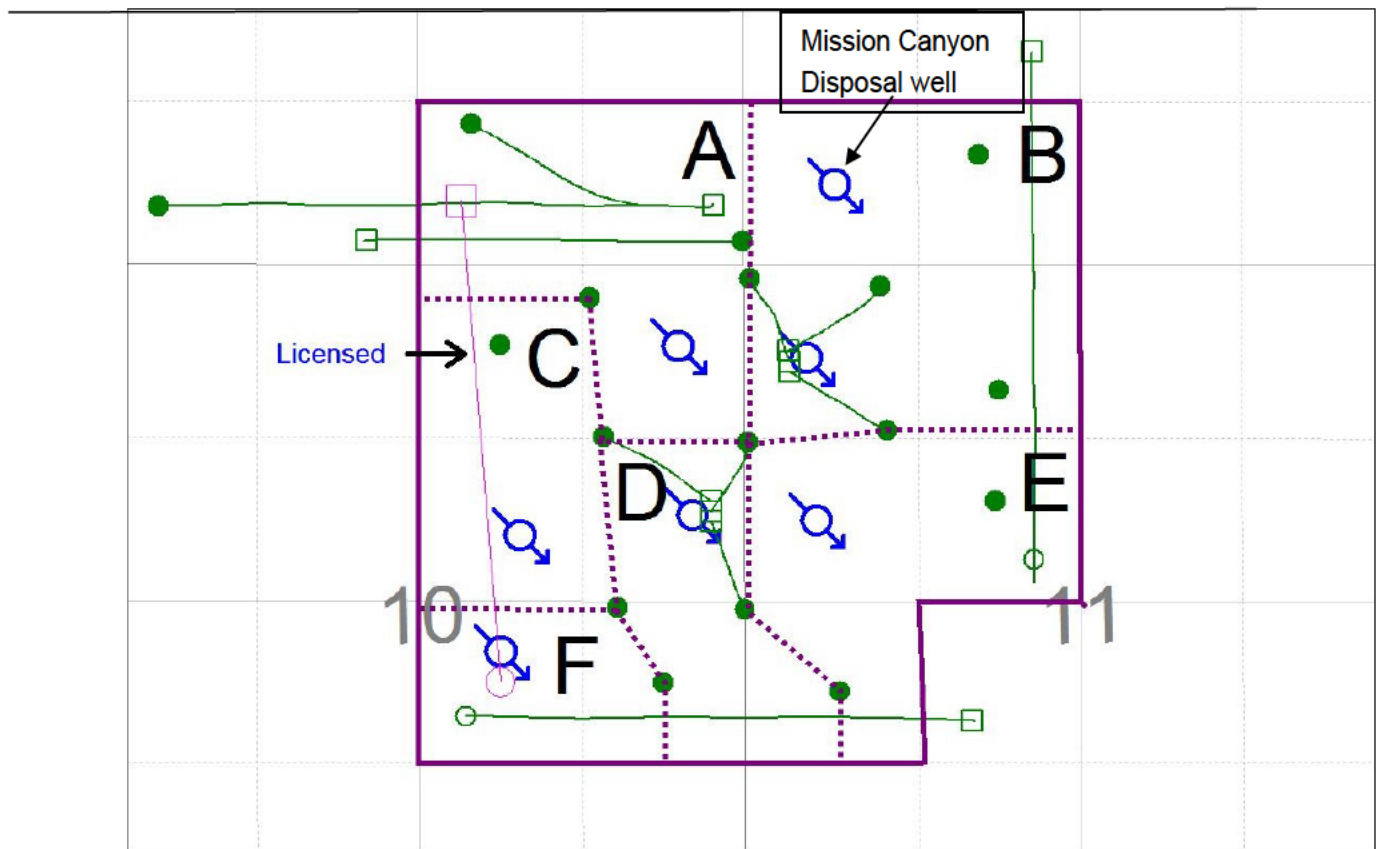
BATTERY UPGRADE

PROCESS FLOW DIAGRAM (PFD) PAGE 5 OF 5

REV	DESCRIPTION	DATE	CHK	APP
B	ISSUED FOR REVIEW	16/06/2011	MB	
A	CURRENT ARRANGEMENT	16/06/2010	MB	

DRWN BY:	SCALE:	JOB NUMBER:	DRAWING NUMBER:	REV NO:
CAL	MS	0146	0146-PP-100	B

## ATTACHMENT 2: Map of the Water Flood including Patterns



### ATTACHMENT 3: Allocation factors for Waterflood Patterns

Well	Allocation Factors					
	Pattern A	Pattern B	Pattern C	Pattern D	Pattern E	Pattern F
<b>00/7-10</b>						<b>0.5</b>
02/7-10				0.4	0.1	0.5
00/8-10				0.5		0.5
C0/8-10			0.33	0.33		0.34
D0/8-10				0.5	0.5	
<b>00/9-10</b>				<b>1</b>		
1W0/09-10	0.25	0.25		0.25	0.25	
<b>00/10-10</b>			<b>1</b>			
00/15-10			1			
<b>00/16-10</b>	<b>1</b>					
B0/16-10	0.33		0.33	0.34		
C0/16-10	0.5		0.5			
00/5-11				0.5	0.5	
00/11-11					1	
02/11-11		0.7			0.3	
<b>00/12-11</b>					<b>1</b>	
<b>00/13-11</b>		<b>1</b>				
A0/13-11		0.5			0.5	
C0/13-11	0.5	0.5				
D0/13-11		1				
00/14-11		1				
00/3-14		1				
<b>00/4-14</b>		<b>0</b>				
00/1-15	1					
00/4-15	1					

Black text wells = Producers

Blue text wells = Injectors

NOTE: 00/04-15 producer has an allocation factor of **1** associated to the production that is included as part of the waterflood. The portion of production of this well that is included in the unit and waterflood is **55.0774%**.

NOTE: **00/4-14** Injector has an allocation factor of **0** because the current injection is into the Mission Canyon Formation. Up until January 31, 2008, the fluid was entering the Lower Amaranth.

NOTE: **00/07-10** Injector has an allocation factor of **0.5** to account for the water losses outside the unit.