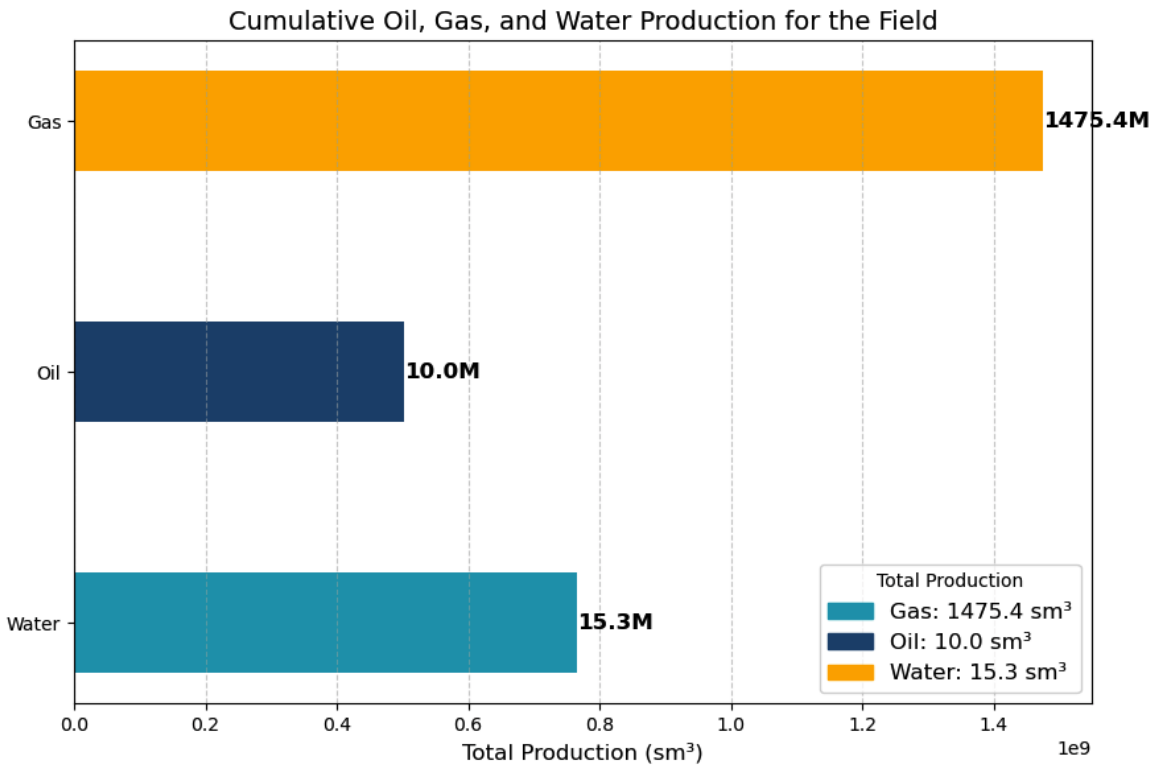
OIL WELL PRODUCTION DATA ANALYSIS

The Volve Field production dataset provides historical records of oil, gas, and water volumes, along with well performance data collected during production. This analysis explores cumulative production trends, individual well performance, water injection impact, and production decline patterns to assess field behavior and optimization potential.

1. Field-Level Production Analysis

Cumulative Oil, Gas, and Water Production for the Field

This provides a high-level overview of the total volumes of hydrocarbons and water extracted from the field over the recorded period.



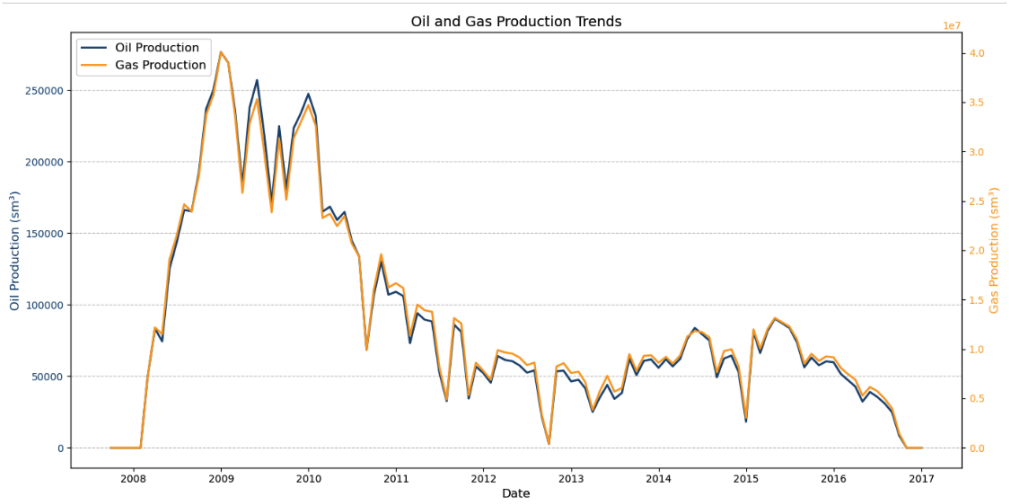
Observations:

• Gas Dominates Production: The field has produced a total of 1,475.4 million sm³ of gas, significantly outpacing both oil and water production. This indicates that the reservoir is highly gas-rich, potentially reflecting a gas cap or a gas-driven reservoir mechanism.

• Oil Production: The cumulative oil production is 10.0 million sm^3, which is substantially lower than gas production. This suggests that while the field has yielded substantial hydrocarbons, its oil reserves may be more limited or production may have been constrained by reservoir characteristics.

• Water Production: The cumulative water production stands at 15.3 million sm^3, exceeding oil production. The relatively high water production could indicate water encroachment, natural aquifer support, or long-term water breakthrough issues in the field.

Oil and Gas Production Trends (Sampled by Month)



The production trend analysis reveals key patterns in oil and gas output over time:

• Rapid Ramp-Up (2008-2010): Production increased sharply, peaking between 2009 and 2010, indicating the early high-productivity phase of the field.

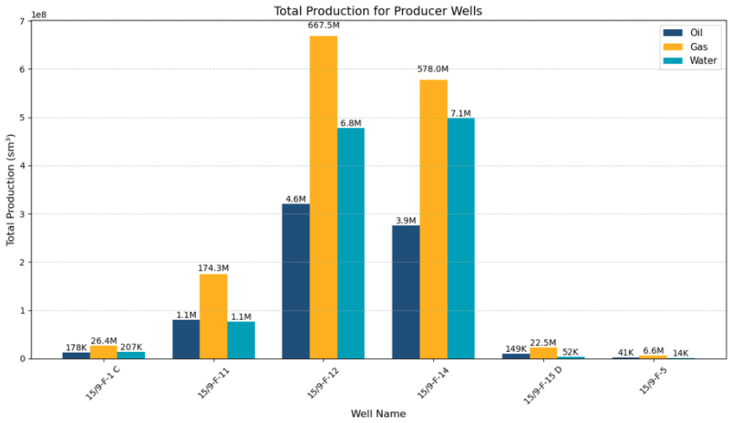
• Decline Phase (2011 Onward): A steady decline follows, suggesting reservoir depletion, operational constraints, or water breakthrough issues.

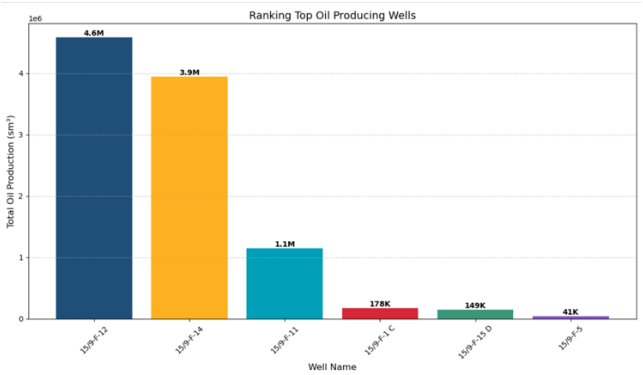
• Close Oil-Gas Relationship: Oil and gas production trends closely mirror each other, indicating a strong correlation—likely due to reservoir drive mechanisms or associated gas production.

• Fluctuations Post-2013: Production fluctuations may reflect well interventions, operational changes, or secondary recovery efforts.

2. Well-Level Production Analysis

Well Production Performance Across All Producing Wells

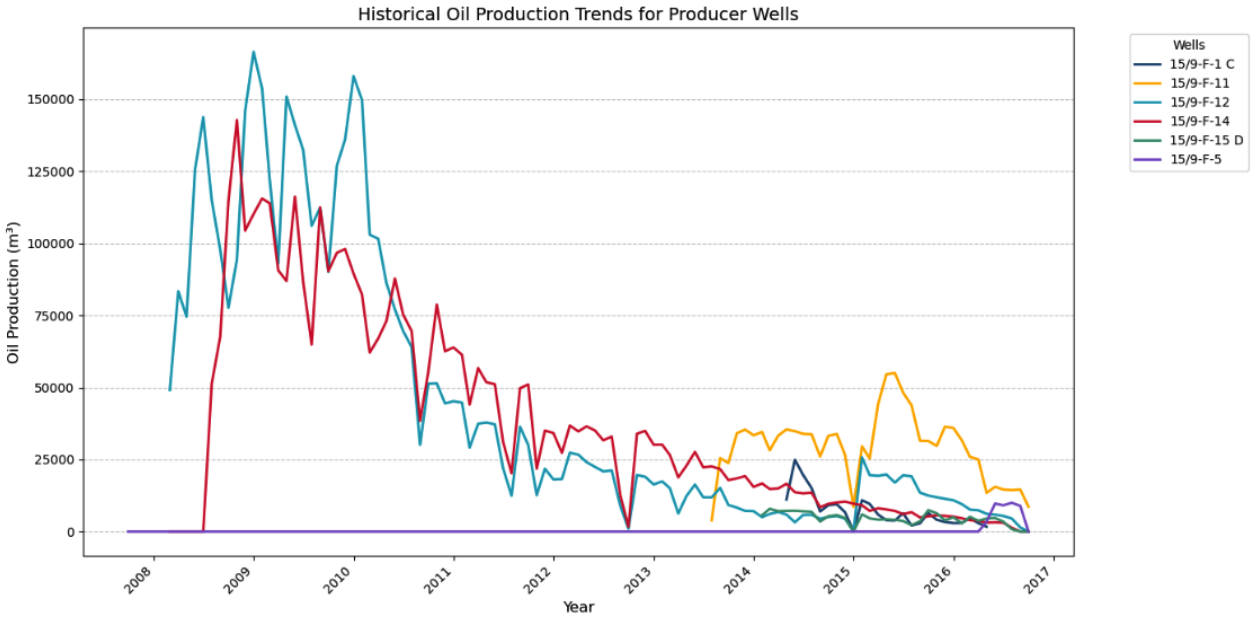




Observations:

- F-12 and F-14 are the highest oil producers, with 4.6M sm³ and 3.9M sm³, respectively.
- F-11 produces significantly less oil (1.1M sm³) but has high gas output (174.3M sm³), suggesting a potentially high gas-oil ratio (GOR).
- F-12 and F-14 also show the highest water production (>6M sm³), indicating possible water breakthrough issues.
- F-5 was a late-stage producer contributing minimal oil.
- F-1C and F-15D show marginal production, indicating their limited impact on overall field output.

Historical Oil Production Trends for Producing Wells

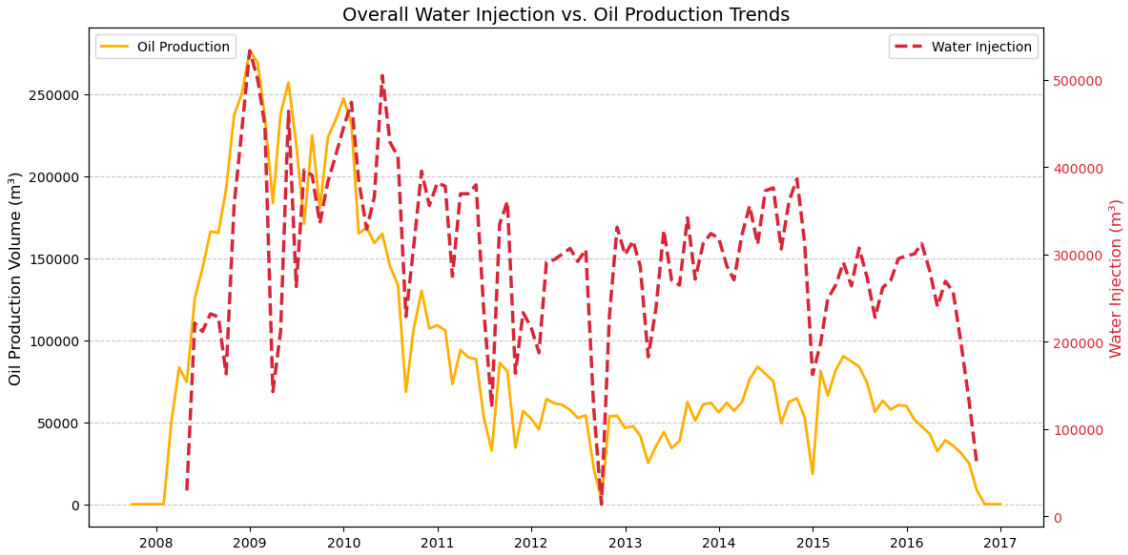


Observations:

- F-12 and F-14 had the highest initial production rates, peaking between 2009 and 2010, followed by a gradual decline.
- F-11 was brought onstream around mid-2013 and maintained relatively higher production levels compared to other wells during the later stages of the field's life. This suggests it may have been targeted as a key producer when earlier wells experienced significant decline.
- F-5 was brought on stream late, contributing minimal oil before shutdown.
- All wells show a declining trend over time, consistent with natural depletion and potential reservoir pressure decline.

3. WATER INJECTION ANALYSIS

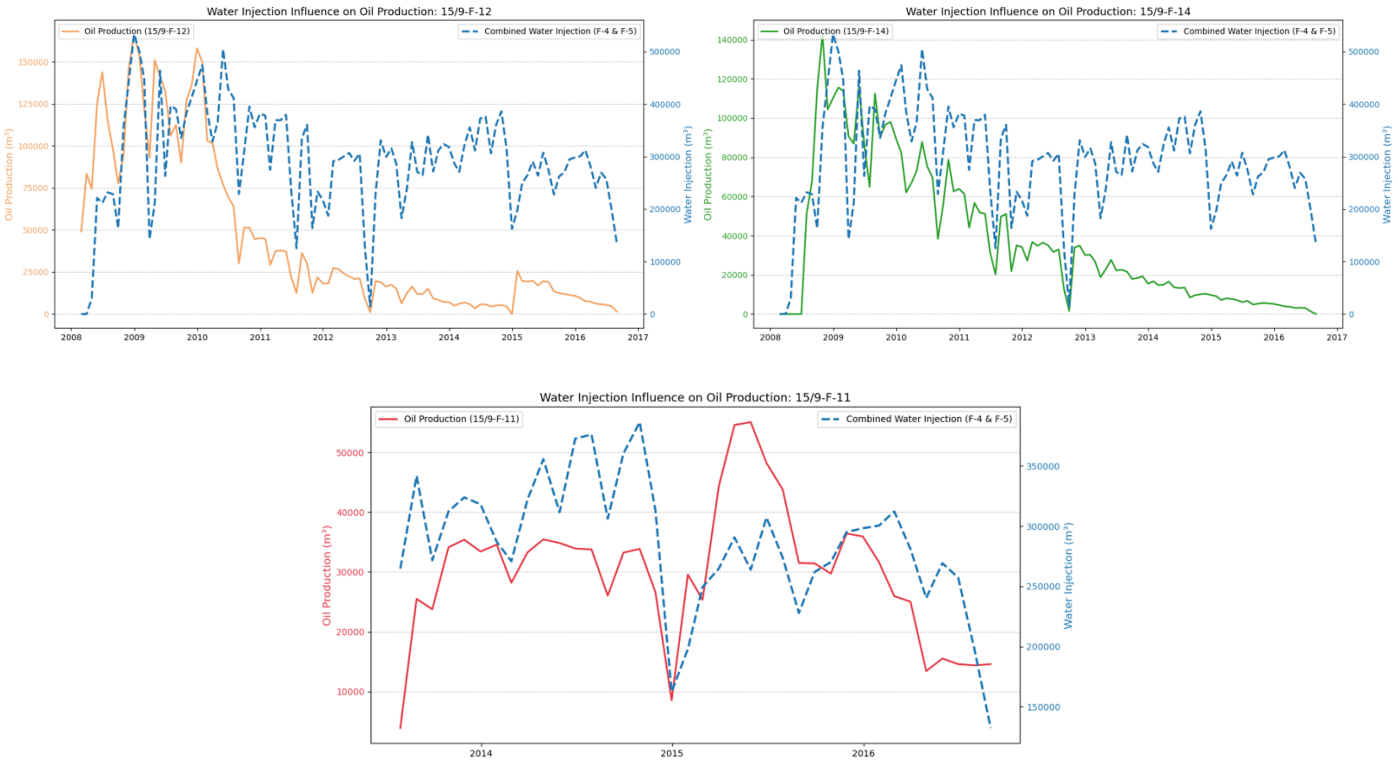
Overall Water Injection vs. Production Trends



Observations:

- Water injection peaked early (2009-2011) aligning with the highest oil production, indicating that it played a role in maintaining reservoir pressure.
- From 2011 onward, oil production declined sharply despite continued water injection, indicating that injection became less effective, possibly due to water breakthrough or reservoir depletion.
- The moderate increase in oil production between mid-2013 and late 2015 corresponds with F-11 coming on stream, suggesting that the well helped maintain field production during late field life.

Well-Specific Water Injection Influence on Top Oil Producers: F12, F14, F11



Observations:

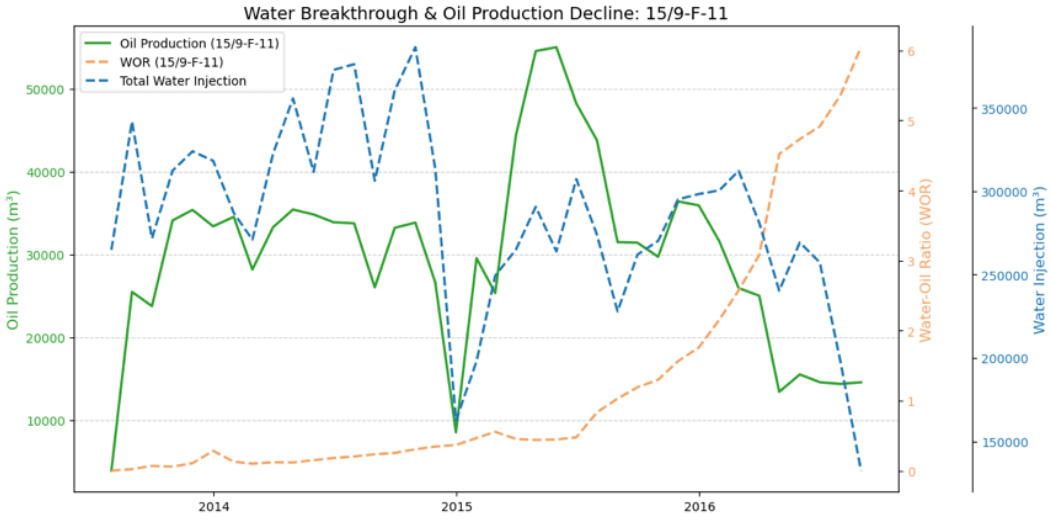
- **F-12 (Early Strong Support, Late Decline)**: F-12 production was highest between 2008 and 2010, coinciding with high early-stage injection, indicating effective pressure support. However, from 2011 onward, production declined sharply despite sustained injection, suggesting reduced efficiency, potential water breakthrough, or depletion. A brief production increase in 2015 followed a temporary reduction in injection, implying that previous high injection rates may have caused inefficient sweep or early water breakthrough. When injection was resumed at a moderate level, production stabilized briefly before going back to its decline.

- **F-14 (Consistent Injection Support, Gradual Decline)**: F-14 also experienced early production peaks (2008-2010) which aligned with high injection rates, but its decline was more gradual than F12, suggesting that it maintained better injection efficiency for a longer period before depletion effects set in.

- **F-11 (Late-Stage Producer with Injection Support)**: F-11, which started producing in 2013, displayed a strong correlation between injection and production. Similar to F12, a significant production surge in 2015 occurred right after a temporary reduction in injection rates, suggesting that previous high injection levels may have led to inefficient sweep of oil.

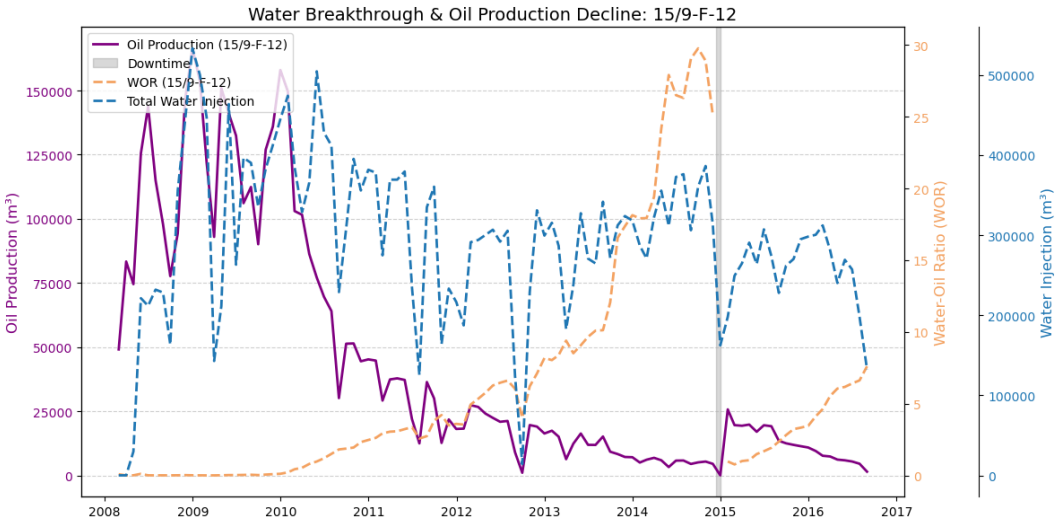
WATER BREAKTHROUGH & PRODUCTION DECLINE ANALYSIS

WELL: 15/9 F-11



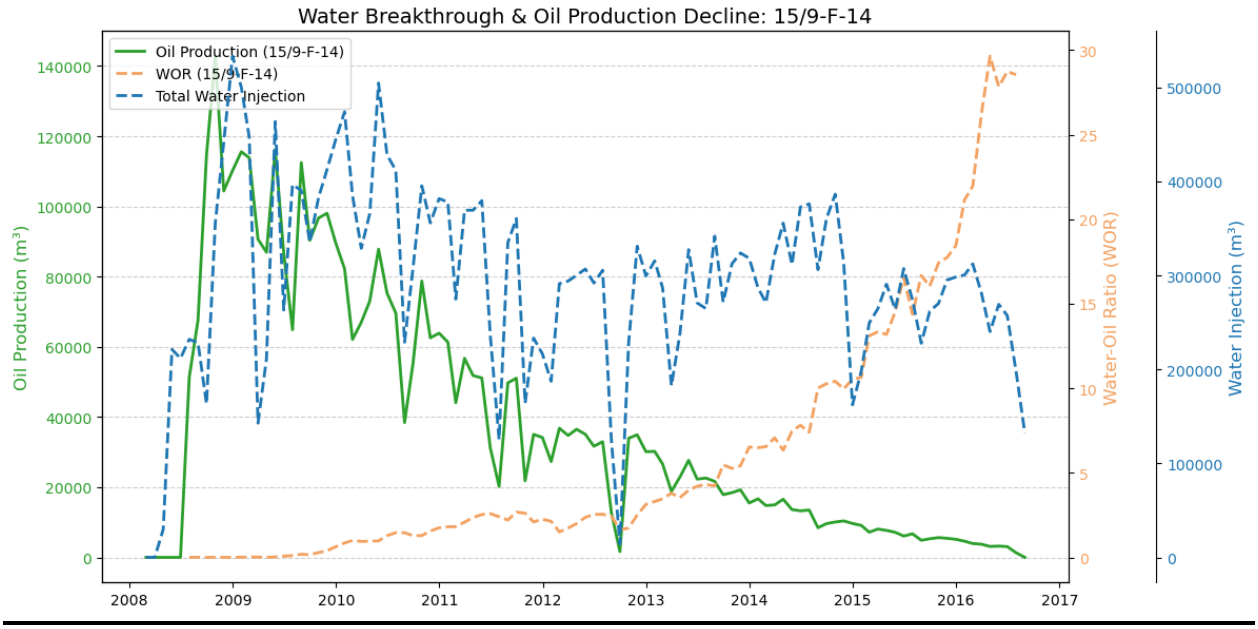
The Water-Oil-Ratio (WOR) trend for F-11 highlights the impact of water breakthrough on production performance. From 2013 to mid-2015, WOR remained low while oil production was stable, suggesting effective injection support. However, a sharp rise in WOR from late 2015 onward indicates increasing water encroachment. A temporary drop in injection in mid-2015 coincided with a production surge, confirming that excessive injection may have restricted oil mobility. As injection resumed at a lower rate, production initially improved, but WOR continued rising, signaling water breakthrough. Despite declining injection rates, production fell further, showing that water had overtaken oil recovery.

WELL 15/9 F12



The WOR trend for F-12 shows a water breakthrough pattern and its impact on oil production. Between 2008 and 2010, oil production peaked while WOR remained low, indicating effective water injection support. From 2011 onward, WOR steadily increased, aligning with a sharp production decline, suggesting early breakthrough. A brief rise in production in 2015 followed a temporary drop in injection, further supporting the idea that excessive injection may have led to inefficient sweep. After injection resumed, WOR rose significantly, exceeding 20 by late 2015, confirming severe water encroachment. By 2016, oil production had dropped to minimal levels, showing that water-cut dominance had overtaken recovery efforts.

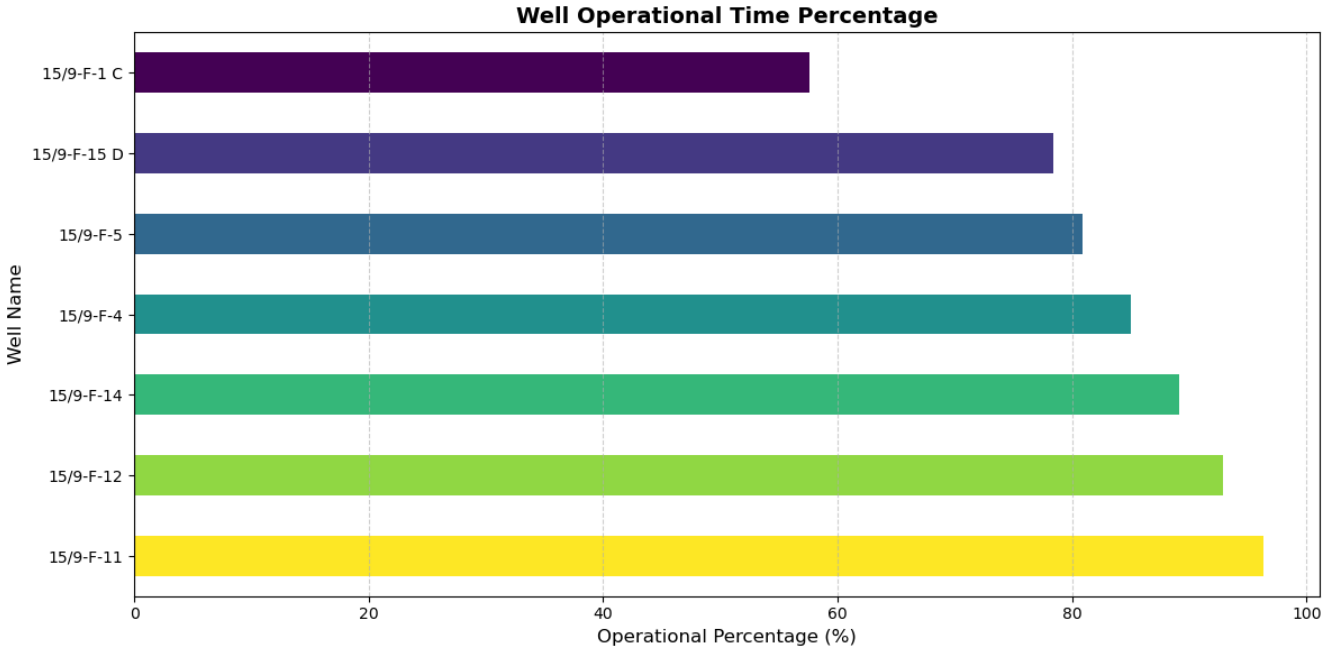
WELL 15/9 F14



The WOR trend for F-14 follows a pattern similar to F-12 but with a more gradual decline in production. From 2008 to 2010, oil production was high alongside high injection rates, indicating effective pressure support. Unlike F-12, F-14 sustained moderate production levels for a longer period, with WOR remaining relatively low until latter part of 2013. From that point onward, WOR rose steadily, aligning with declining oil production. By 2016, WOR spiked sharply, confirming severe water breakthrough with decline in oil production. While injection initially supported stable production, WOR gradually increased over time, and by 2016, water production became dominant, coinciding with a sharp decline in oil production.

WELL OPERATIONAL PERFORMANCE ANALYSIS

The operational time analysis provides insights into the duration each well was actively producing or injecting. F-11 had the highest operational time (96.3%), followed closely by F-12 (92.8%) and F-14 (89.1%), indicating sustained production efforts. Injector wells, F-4 and F-5, maintained over 80% operational time, supporting field pressure maintenance. Lower operational percentages, such as in F-1C (57.6%), suggest either late-stage production entry or extended shut-in periods. The table also highlights cumulative production volumes, with F-12 and F-14 leading in oil recovery, while F-11 recorded the highest gas output. These findings show production efficiency and well management over the field's lifecycle.



Well Name	Total Recorded Days	Days Operational	Oil Production (Sm³)	Gas Production (Million Sm³)	Water Production (Sm³)	Operational Time (%)
15/9-F-11	1165	1122	1147849.10	174.310521	1090806.27	96.309013
15/9-F-12	3056	2837	4579609.55	667.542278	6833320.37	92.833770
15/9-F-14	3056	2723	3942233.39	578.009542	7121249.74	89.103403
15/9-F-4	3327	2828	0.00	0.000000	0.00	85.001503
15/9-F-5	3306	2674	41160.68	6.561826	13533.18	80.883243
15/9-F-15 D	978	767	148518.56	22.505351	52366.40	78.425358
15/9-F-1 C	746	430	177709.33	26.440919	207302.39	57.640751