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Integrated Artificial Lift Excellence: Technologies, Operations, and the Digital Future

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Integrated Artificial Lift Excellence: Technologies, Operations, and the Digital Future



A Holistic Integrated Asset Modelling Approach for Gas Lift Optimisation in a Mature Gas-Lifted Offshore Field

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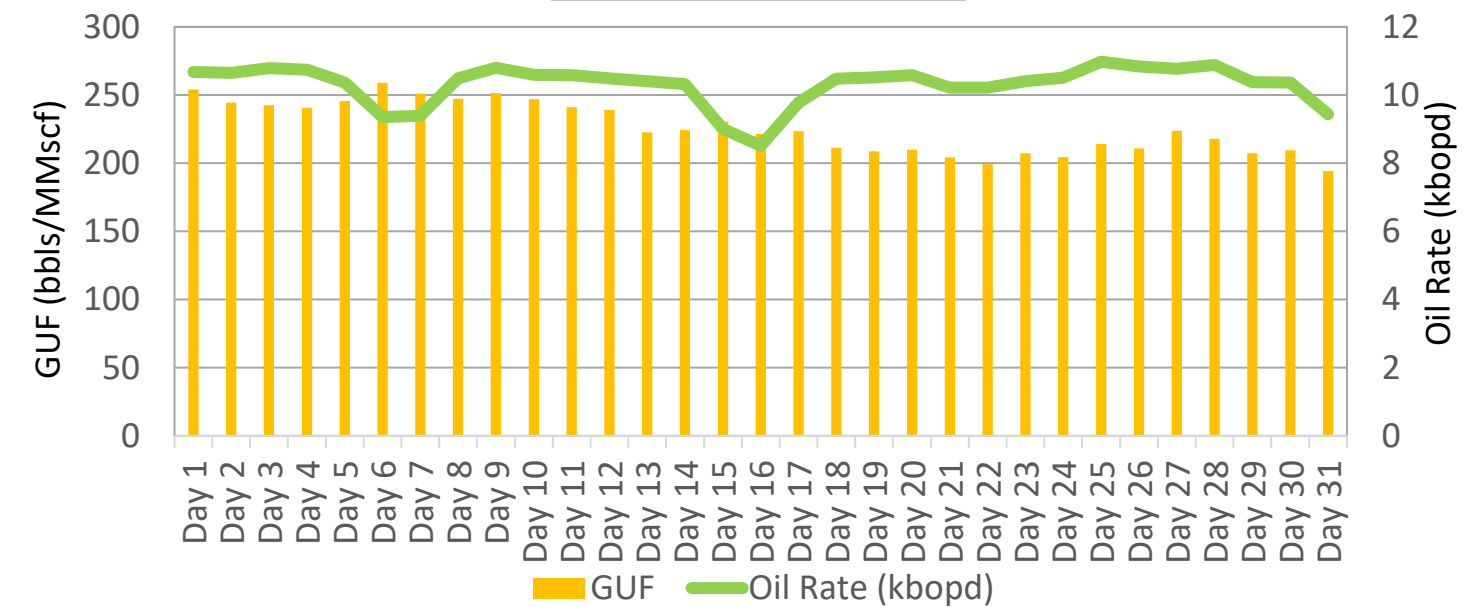
Field A Challenge

Late-life gas-lifted Field A exhibits declining and unstable Gas Utilisation Factor (GUF) trends due to gas lift over-injection, gas lift valve integrity issues, and ineffective multipoint injection. Heavy reliance on **manual, fragmented well-surface analysis** results in **inefficient lift gas distribution** and uncertainty in optimisation decision-making, highlighting the need for integrated asset-level validation.

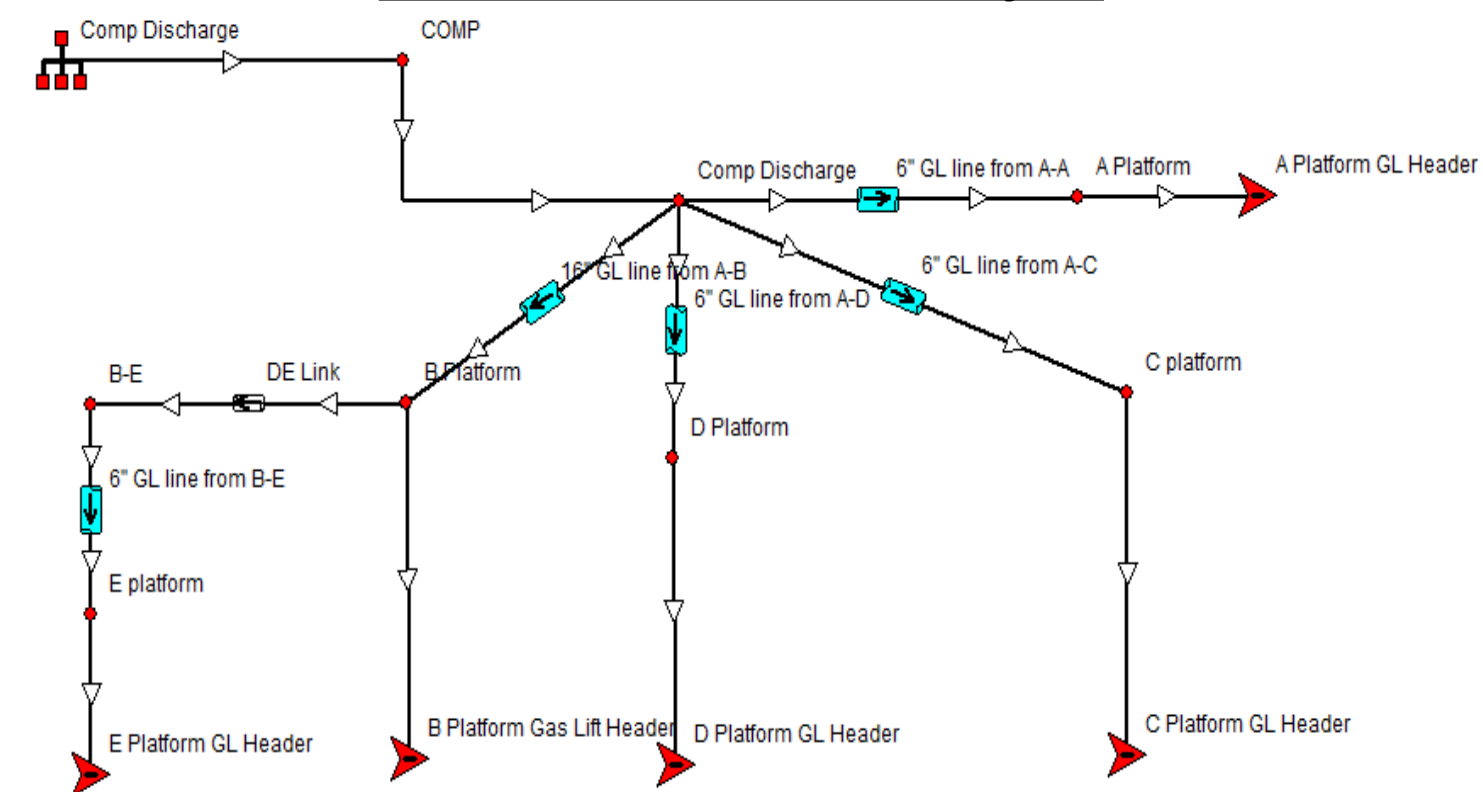
Opportunity

- 1 **Integrated Asset Modelling-Digital Oil Field (IAM-DOF)** addresses Field A gap via **real-time surveillance and integrated well-network modelling.**
- 2 IAM-DOF **enables proactive detection and timely arrest of under-performing wells**, through effective assessment of gas-lift distribution and backpressure management in Field A.
- 3 Gas lift redistribution was successfully implemented with **increased gas sales availability, improved GUF by ~60 bbls/MMscf, and delivered up to 10% oil production uplift.**

Field A GUF Trend



Field A Gas Lift Network Layout



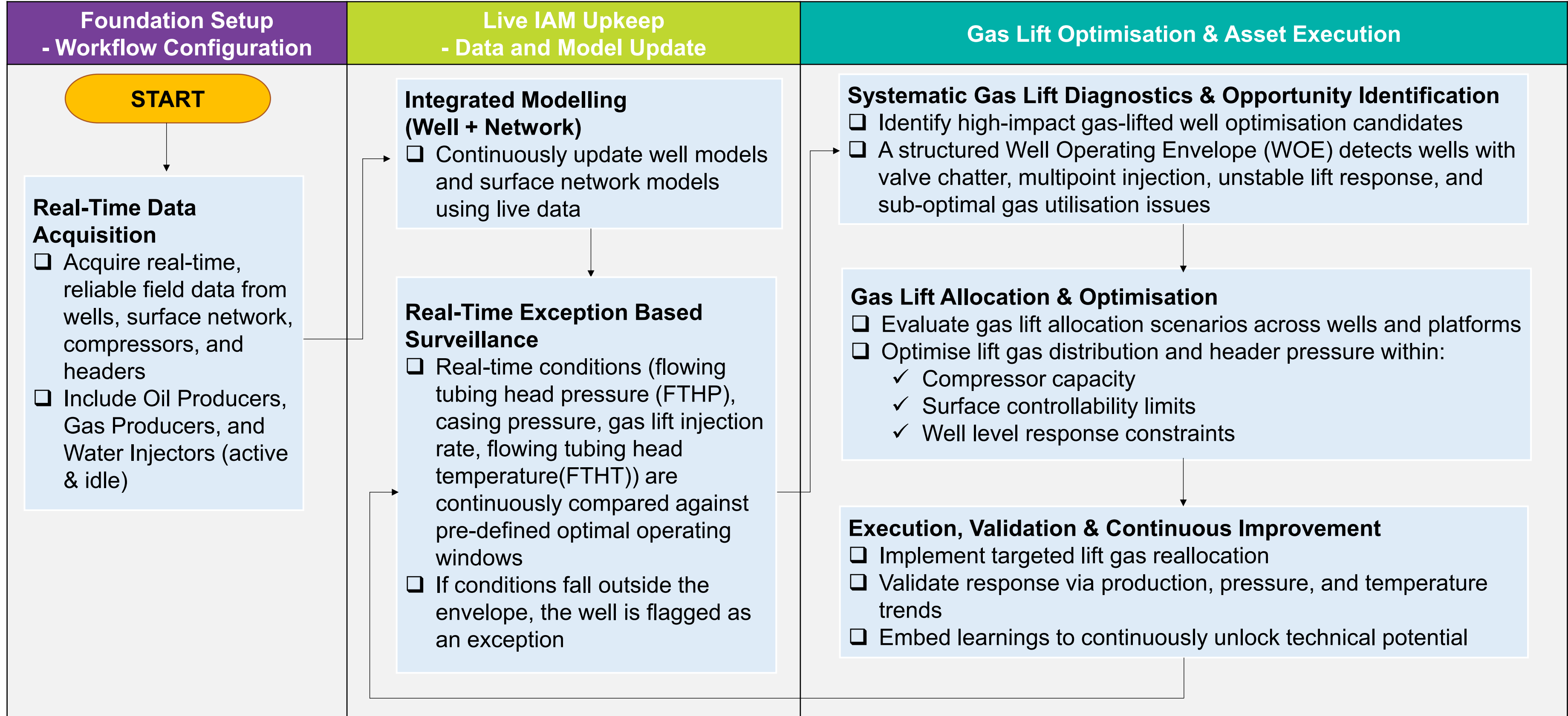


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Field A IAM-DOF enabled Gas Lift Optimisation (GLOP) workflow



A DOF model of Field A continuously mirrors real-time operating conditions to drive an end-to-end GLOP workflow.





Exception Based Surveillance (EBS)



IAM-based EBS shifts surveillance from routine monitoring to exception-driven decision making.

Well surveillance dashboard showing current well operating points benchmarked against optimum set points, allowing automatic flagging of abnormal behavior

Well Surveillance

WELL	WHP psig	WHT °C	CHP psig	GL Rate MMscf/d	Well Test Date
WELL C1	399	76	0	2.49	04/03/2026
WELL C2	328	64	1,065	1.00	04/03/2026
Optimum Value	324	64	1066	0.98	
WELL C3	0	76	936	0.79	04/03/2026
WELL C4	0	87	0	2.84	05/03/2026
WELL C5	314	101	1,322	1.47	17/03/2026
WELL C6	1,478	102	1,409	1.16	16/04/2026
WELL C7	88	30	1,412	0.00	04/10/2025

Well surveillance with production target and well uptime tracking, enabling prioritization of wells requiring intervention

WELL	Flowing Status		One Day Rolling		WHP psig	CHP psig	FLT °C	GL Rate MMscf/d	GL Healthiness	Well Test Date
	Current	MTL	Δ % Qoil	Uptime						
WELL C8	●	●	-3.1	24.00	305	1,323	102	1.5	●	16/03/2026
WELL C9	●	●	-3.4	24.00	398	1,151	101	1.2	●	07/03/2026
WELL C10	●	●	-4.3	24.00	317	0	89	0.9	●	05/03/2026
WELL C11	●	●	-3.4	24.00	0	1,200	97	0.9	●	05/03/2026
WELL C12	●	●	-3.8	24.00	353	1,177	83	1.2	●	06/03/2026
WELL C13	●	●	-3.6	24.00	0	1,071	91	0.8	●	09/03/2026
WELL C14	●	●	-12.7	24.00	0	1,123	82	0.3	●	11/03/2026
WELL C15	●	●	-4.5	24.00	344	968	68	1.3	●	05/03/2026
WELL C16	●	●	-3.7	24.00	319	1,226	84	1.2	●	03/03/2026
WELL C17	●	●	-4.3	24.00	310	1,224	41	1.0	●	07/03/2026
WELL C18	●	●	-2.4	24.00	257	1,206	105	0.8	●	04/03/2026
WELL C19	●	●	-4.1	24.00	401	1,205	92	1.1	●	04/03/2026

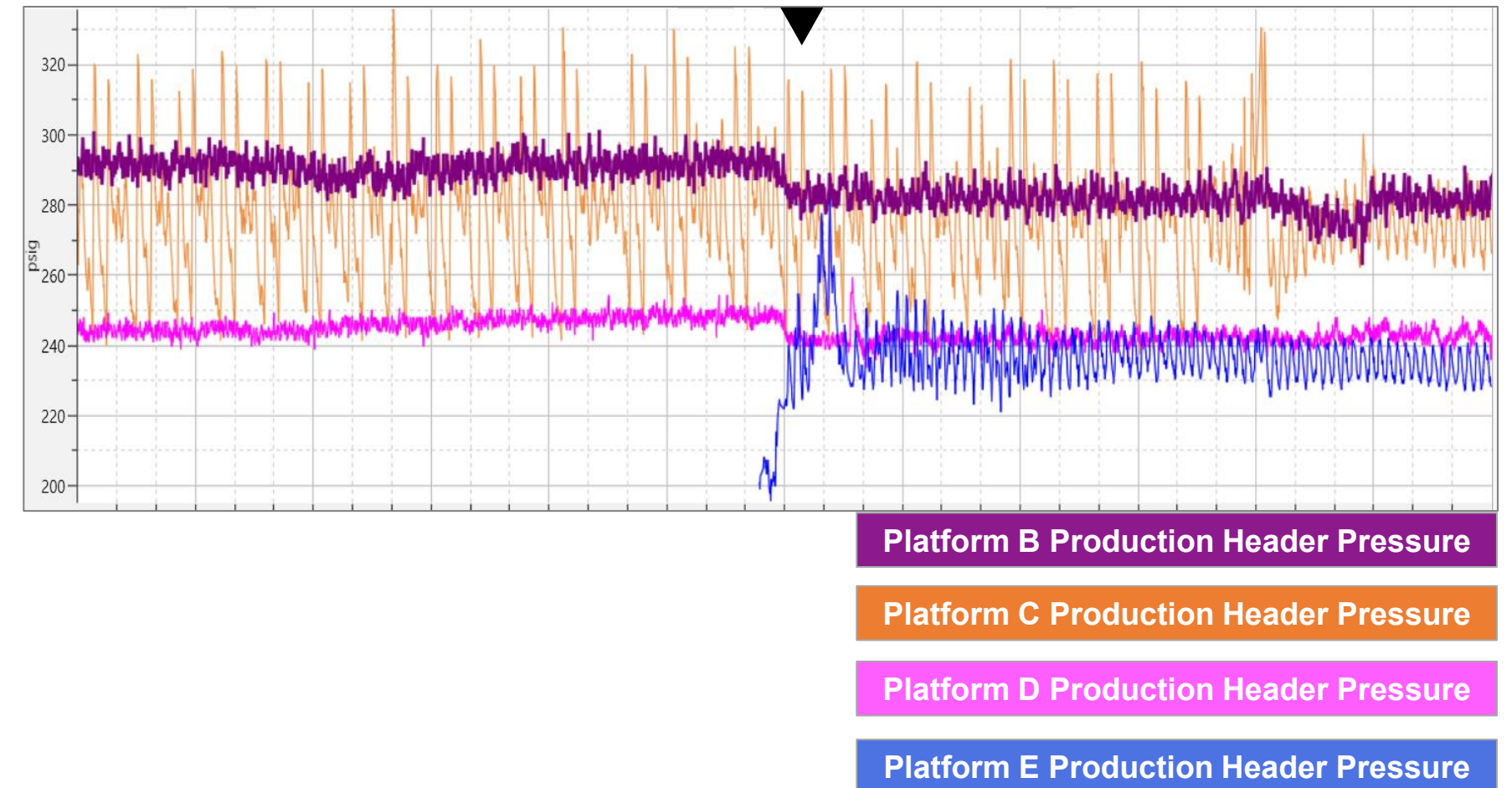
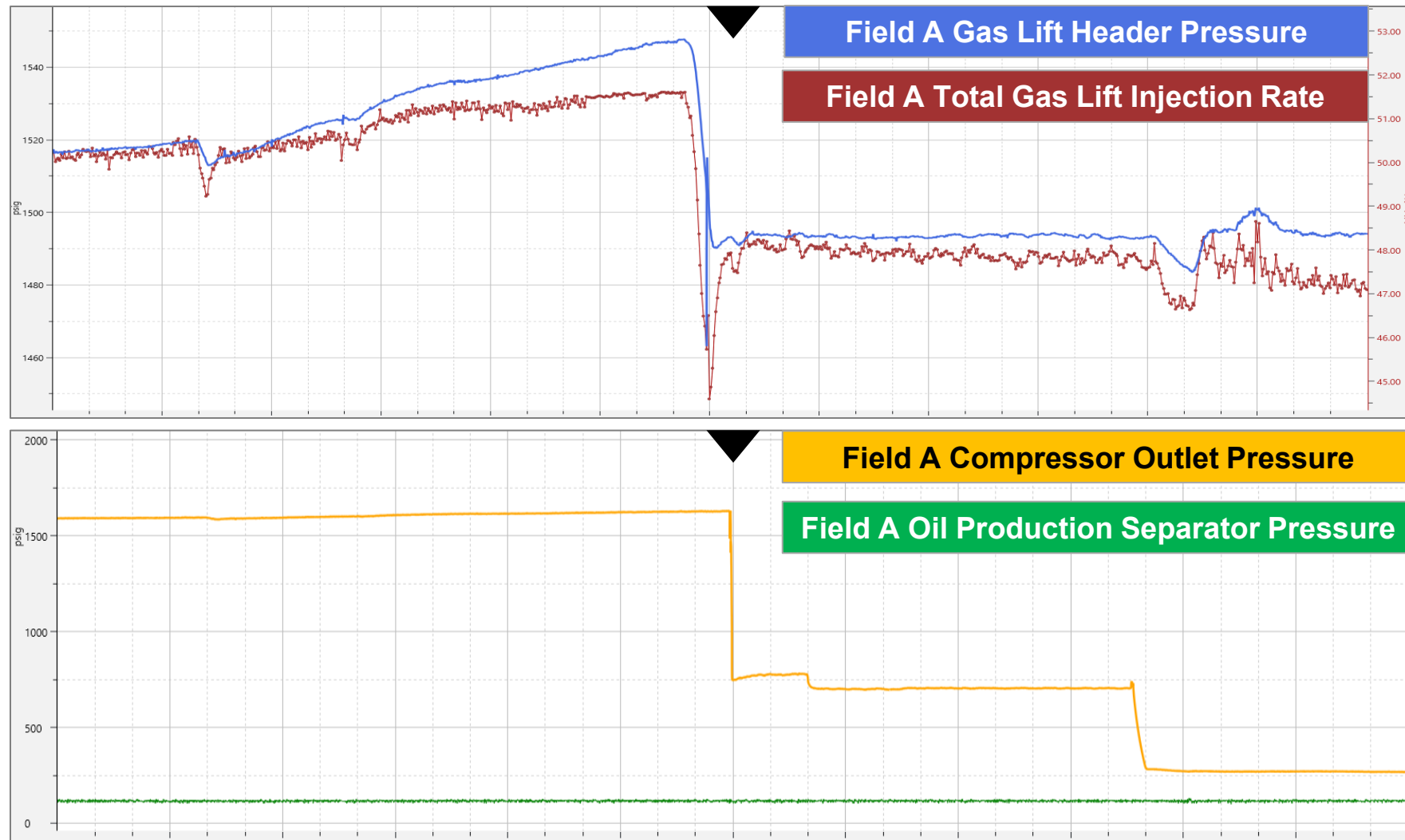


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Impact of Compressor Pressure Step-Down On Gas Lift and Production Network



Leveraging IAM-DOF surveillance and network modelling, a compressor pressure step-down reduced gas-lift header pressure by ~60 psig and injection by ~10%, while sustaining production.



- 1 System backpressure was reduced across all platforms, with ~3–10 psig reductions in production header pressures.
- 2 Platform B, the major producing platform, exhibited the strongest response (~8–10 psig), confirming it as the primary contributor to production uplift from gas lift redistribution.
- 3 The stabilised pressure response following the step change demonstrates the system's sensitivity to gas lift redistribution, rather than a short-term transient effect.



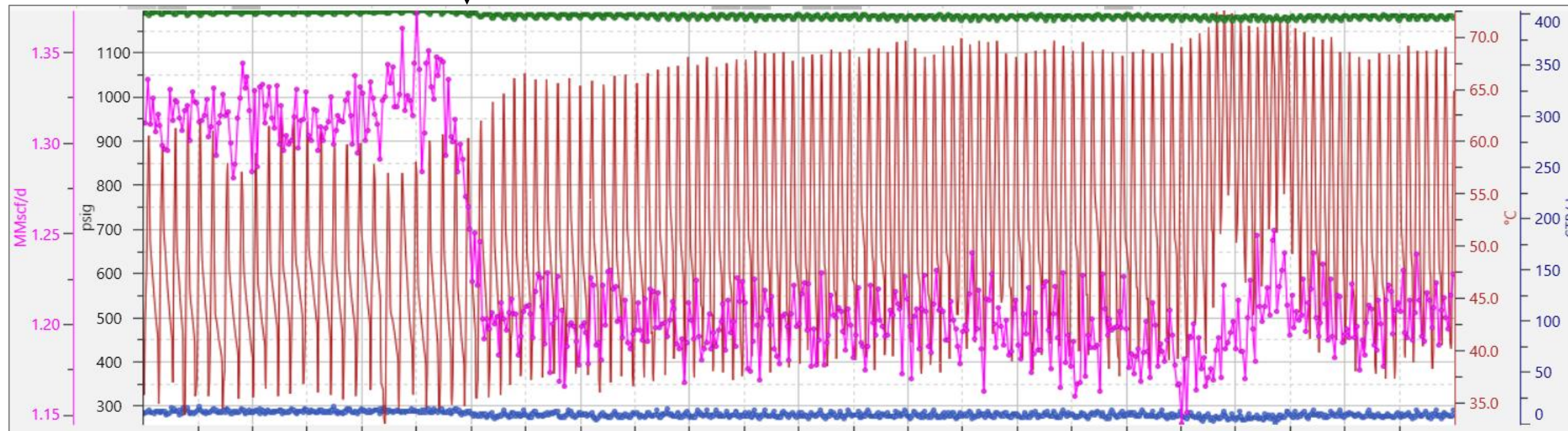
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Well-Level Performance Response

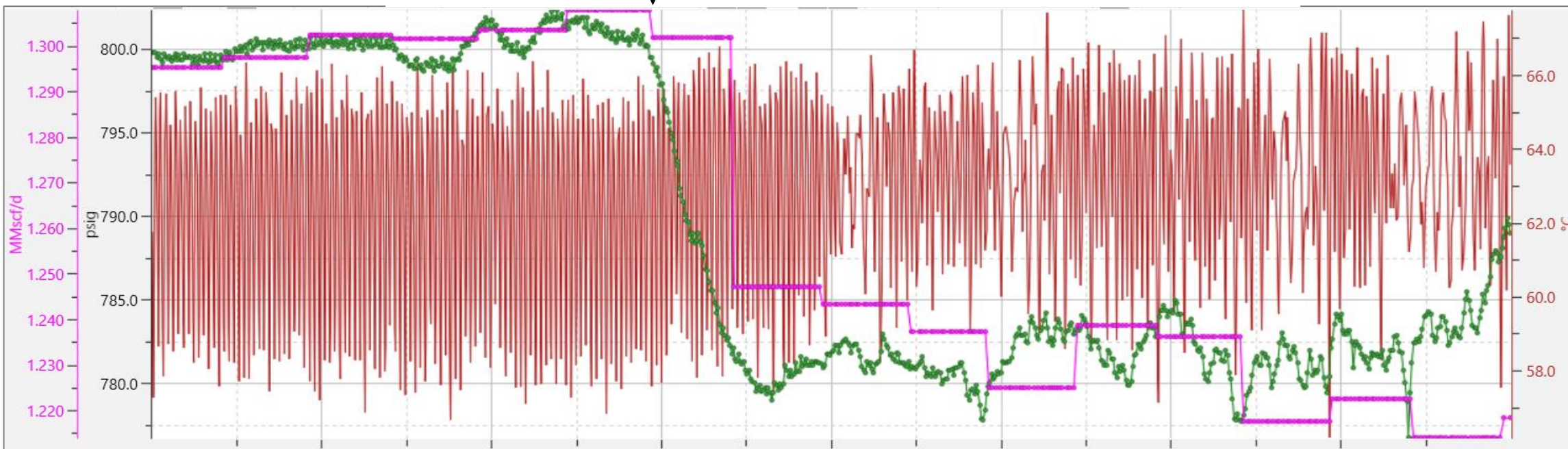


Platform backpressure relief reduced FTHP and improved lifting efficiency at well level

Well B1 Performance



Well B2 Performance



Casing Head Pressure

Wellhead Temperature

Gas Lift Injection Rate

Wellhead Pressure

- System step-down led to consistent **flowing tubing head pressure (FTHP) reduction of ~5–10 psig across key oil-producing wells**, confirming effective transmission of platform-level backpressure relief to the well level and improved drawdown.
- Observed **~1–3 °C improvement in flowing tubing head temperature (FTHT) across most wells** indicates enhanced gas–liquid lifting efficiency under redistributed gas-lift conditions.
- Gas Lift Redistribution Impact on Challenged Wells:
 - ❑ Well B1: FTHP reduction was achieved; however, FTHT remained higher with larger fluctuations, indicating partial improvement but continued sensitivity to multipoint injection instability.
 - ❑ Well B2: FTHP reduction translated into a more stable FTHT response, highlighting that backpressure reduction helps mitigate gas-lift inefficiency caused by surface controllability and FCV limitations.



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Conclusion



- ❑ The Q1 2026 performance test validated the IAM-guided strategy, demonstrating that gas-lift header pressure reduction enabled improved gas lift redistribution, reduced system backpressure, and delivered sustained, measurable production gains at field scale.
- ❑ Routine IAM-based surveillance proved critical in detecting sub-optimal gas-lift distribution and underperforming wells, enabling timely lift gas reallocation, minimising avoidable production losses, and supporting coordinated well and surface network optimisation.
- ❑ Periodic integrated network model updates, supported by high-quality data and continuous operational engagement, embedded test learnings into Digital Oil Field (DOF) practices, enabling representative forecasting, continuous optimisation, and sustained production performance in a digitalised operating environment.



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