Geosteering Under Structural Uncertainty

Project: GeoSteering Structural Uncertainty
Synthetic replay run and simplified causal comparison. Training and portfolio tool; not validated for live operations.
Run ID: 4eb607b4-68a4-48fa-b0ea-8af5a5fb8f30
Status: COMPLETE; revealed MD (ft): 7000.0

Measured result

Over the same 5000-ft lateral, HOLD placed 38.07% (1903.6 ft) in zone; the observation-guided causal policy placed 97.17% (4858.7 ft) in zone. Lateral DLS violation counts: HOLD 0, guided 0. This controlled synthetic result relies on the disclosed signed layer calibration. Replay recommendations did not change the recorded path.
scenario_version: structural_dip_01-v1
seed: 123
code_revision: 14ffc90dfd547cfc1217d1ce3a059b4928639dc2
dirty_working_tree: True
coordinate_reference: LOCAL_EAST_NORTH_FT; LOCAL_TVD positive down

Data summary and QC

Well	Curves	QC valid	Warnings
active_01	GR, RES	True	
offset_01	GR, RES	True	
offset_02	GR, RES	True	
offset_03	GR, RES	True	

Input provenance (SHA-256)

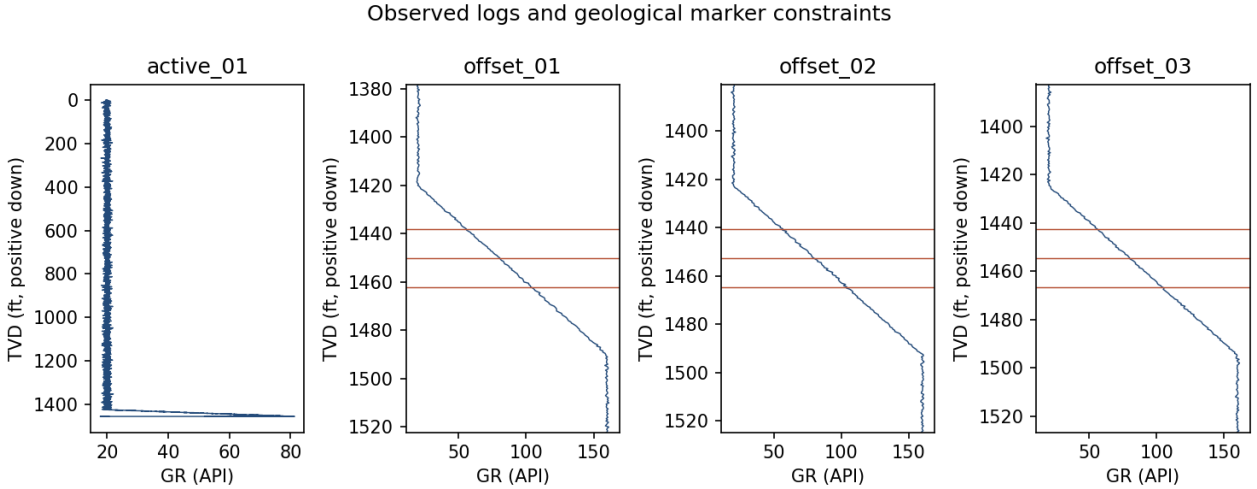
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Correlation and markers

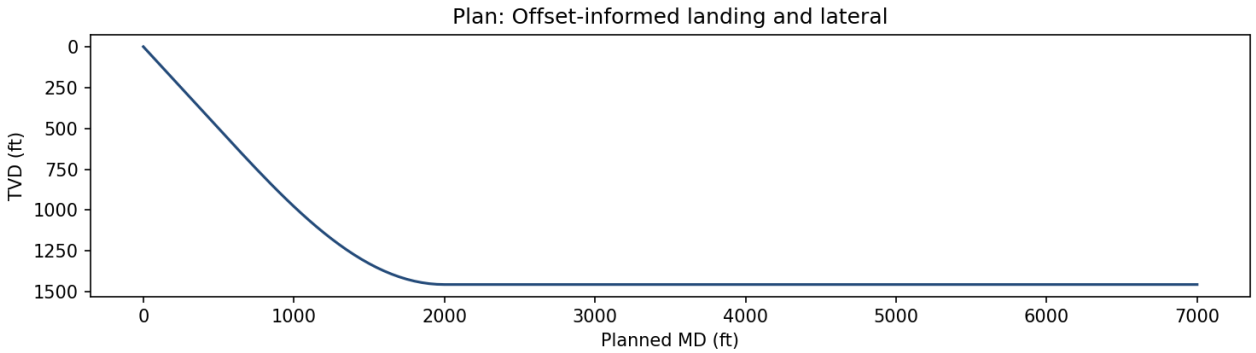
Offset formation picks constrain a regional estimate in shared along-track x and local TVD. Active observations and markers are limited to the saved revealed depth.

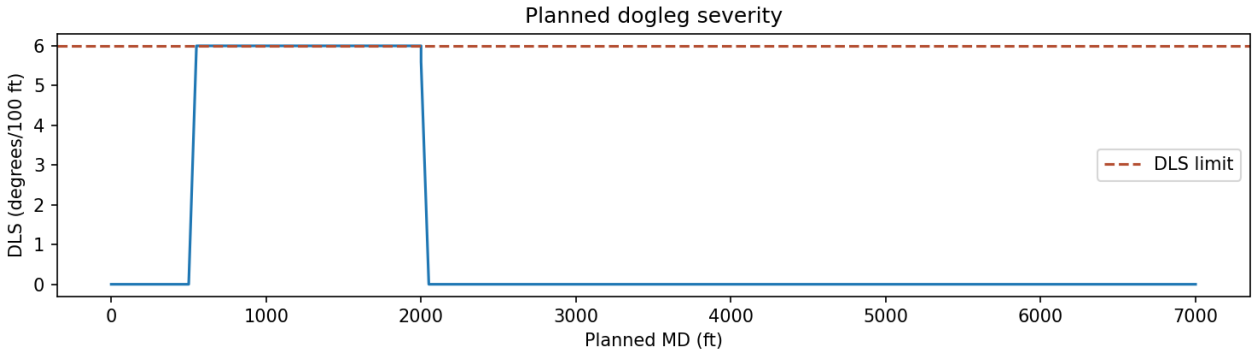
Well	Marker	MD (ft)
offset_01	Top_A	1438.16
offset_01	Mid_A	1450.16
offset_01	Base_A	1462.16
offset_02	Top_A	1440.66
offset_02	Mid_A	1452.66
offset_02	Base_A	1464.66
offset_03	Top_A	1442.66
offset_03	Mid_A	1454.66
offset_03	Base_A	1466.66



Pre-spud plan and DLS

Plan name: Offset-informed landing and lateral; Plan ID: f2de74a6-68cf-48a9-9fb0-1490f423444d
Max DLS constraint: 6.0 degrees/100 ft; exceedance count: 0





Steering decisions and KPI results

Replay recommendations do not change the recorded trajectory. Estimated metrics are frozen at each reveal using the cited interpretation, and exclude the build/landing interval.

Step	MD interval (ft)	Action	Evidence / interpretation version
1	2000-2050	HOLD	Observed MD 2000.0-2000.0 ft; median GR 79.852 API; calibrated center 1455.004 ft TVD; estimated relative position -0.074 ft; version db29c11b-9490-41d0-b742-04ce5975f395
2	2050-2100	HOLD	Observed MD 2030.0-2050.0 ft; median GR 79.574 API; calibrated center 1455.143 ft TVD; estimated relative position -0.213 ft; version e205a8e8-4834-467c-b013-fcef7a42497e
3	2100-2150	HOLD	Observed MD 2080.0-2100.0 ft; median GR 79.222 API; calibrated center 1455.319 ft TVD; estimated relative position -0.389 ft; version 5533b6dd-f050-4166-b733-da8b868a4c89
4	2150-2200	HOLD	Observed MD 2130.0-2150.0 ft; median GR 78.736 API; calibrated center 1455.562 ft TVD; estimated relative position -0.632 ft; version bbe64c7e-552f-4b34-9d4b-d6982ffbca78
5	2200-2250	HOLD	Observed MD 2180.0-2200.0 ft; median GR 78.184 API; calibrated center 1455.837 ft TVD; estimated relative position -0.908 ft; version bbfed10e-31fa-47d5-a0cf-4f7cba585a72
6	2250-2300	HOLD	Observed MD 2230.0-2250.0 ft; median GR 77.574 API; calibrated center 1456.143 ft TVD; estimated relative position -1.213 ft; version 56d42a51-a55d-4715-bfd5-3dccd5e23400
7	2300-2350	HOLD	Observed MD 2280.0-2300.0 ft; median GR 77.171 API; calibrated center 1456.344 ft TVD; estimated relative position -1.414 ft; version ec3a0cff-3a78-4cba-b27e-8627cc3cdb13

Step	MD interval (ft)	Action	Evidence / interpretation version
8	2350-2400	HOLD	Observed MD 2330.0-2350.0 ft; median GR 76.653 API; calibrated center 1456.603 ft TVD; estimated relative position -1.674 ft; version 2c109fc6-f932-4290-a66d-49150b373c57
9	2400-2450	HOLD	Observed MD 2380.0-2400.0 ft; median GR 76.080 API; calibrated center 1456.890 ft TVD; estimated relative position -1.960 ft; version c46d8ca0-d08f-4378-aed6-fab00d9a0a95
10	2450-2500	DROP	Observed MD 2430.0-2450.0 ft; median GR 75.663 API; calibrated center 1457.098 ft TVD; estimated relative position -2.169 ft; version 255f8c03-65e1-4e12-836e-3faaff6c6624
11	2500-2550	DROP	Observed MD 2480.0-2500.0 ft; median GR 75.026 API; calibrated center 1457.416 ft TVD; estimated relative position -2.487 ft; version 90788663-2b9a-419f-982c-c462bbd52158
12	2550-2600	DROP	Observed MD 2530.0-2550.0 ft; median GR 74.618 API; calibrated center 1457.621 ft TVD; estimated relative position -2.691 ft; version 3f9dfbd2-29e3-40db-b54d-915e70042bd6
13	2600-2650	DROP	Observed MD 2580.0-2600.0 ft; median GR 74.192 API; calibrated center 1457.833 ft TVD; estimated relative position -2.904 ft; version edd808bf-7097-47d4-90f6-1cd5cacc8ee1
14	2650-2700	DROP	Observed MD 2630.0-2650.0 ft; median GR 73.569 API; calibrated center 1458.145 ft TVD; estimated relative position -3.215 ft; version 9bc7ee2c-a2c4-4e24-8a68-432c17216a87
15	2700-2750	DROP	Observed MD 2680.0-2700.0 ft; median GR 73.112 API; calibrated center 1458.374 ft TVD; estimated relative position -3.444 ft; version 29748201-02ec-4e62-bb66-04f40f2c83e8
16	2750-2800	DROP	Observed MD 2730.0-2750.0 ft; median GR 72.537 API; calibrated center 1458.661 ft TVD; estimated relative position -3.731 ft; version 7fa9aea5-ac58-40dd-881a-3c91b9c18bc4
17	2800-2850	DROP	Observed MD 2780.0-2800.0 ft; median GR 71.956 API; calibrated center 1458.952 ft TVD; estimated relative position -4.022 ft; version 8afe7663-f4c0-4ef1-8f87-5b22d996bdc5
18	2850-2900	DROP	Observed MD 2830.0-2850.0 ft; median GR 71.682 API; calibrated center 1459.089 ft TVD; estimated relative position -4.159 ft; version e7a6a264-92e2-4394-ae68-3c9077787b74
19	2900-2950	DROP	Observed MD 2880.0-2900.0 ft; median GR 71.080 API; calibrated center 1459.389 ft TVD; estimated relative position -4.460 ft; version b3de3df0-11d5-4123-a592-35fb425fdda5
20	2950-3000	DROP	Observed MD 2930.0-2950.0 ft; median GR 70.535 API; calibrated center 1459.662 ft TVD; estimated relative position -4.732 ft; version a484aee1-9774-49b0-bf28-b48c69569799
21	3000-3050	DROP	Observed MD 2980.0-3000.0 ft; median GR 69.960 API; calibrated center 1459.950 ft TVD; estimated relative position -5.020 ft; version 9c0c2d33-07ce-4f36-be4e-413614dcbed8
22	3050-3100	DROP	Observed MD 3030.0-3050.0 ft; median GR 69.474 API; calibrated center 1460.193 ft TVD; estimated relative position -5.263 ft; version 73a624ae-f99f-4c8a-9d55-988ef908fea2
23	3100-3150	DROP	Observed MD 3080.0-3100.0 ft; median GR 68.951 API; calibrated center 1460.454 ft TVD; estimated relative position -5.525 ft; version 27b94334-ea26-4875-a3cd-28a290d9d1a2

Step	MD interval (ft)	Action	Evidence / interpretation version
24	3150-3200	DROP	Observed MD 3130.0-3150.0 ft; median GR 68.809 API; calibrated center 1460.525 ft TVD; estimated relative position -5.595 ft; version a219cd15-a73c-48ae-9795-24e3670e3456
25	3200-3250	DROP	Observed MD 3180.0-3200.0 ft; median GR 67.830 API; calibrated center 1461.015 ft TVD; estimated relative position -6.085 ft; version 16b1cc57-fb2b-404d-abff-a4fa81d9b1c3
26	3250-3300	DROP	Observed MD 3230.0-3250.0 ft; median GR 67.389 API; calibrated center 1461.235 ft TVD; estimated relative position -6.305 ft; version e4ff6e4c-c3b8-4096-a115-11d70e8c1b51
27	3300-3350	DROP	Observed MD 3280.0-3300.0 ft; median GR 67.234 API; calibrated center 1461.313 ft TVD; estimated relative position -6.383 ft; version 31534f34-2aea-49f0-97c0-7d901a6c9425
28	3350-3400	DROP	Observed MD 3330.0-3350.0 ft; median GR 66.571 API; calibrated center 1461.644 ft TVD; estimated relative position -6.714 ft; version 71b29358-74cc-4073-b466-2929a08eee48
29	3400-3450	DROP	Observed MD 3380.0-3400.0 ft; median GR 66.075 API; calibrated center 1461.892 ft TVD; estimated relative position -6.962 ft; version 4fc7262a-d85f-43af-bc90-b96e2994b361
30	3450-3500	DROP	Observed MD 3430.0-3450.0 ft; median GR 65.477 API; calibrated center 1462.191 ft TVD; estimated relative position -7.262 ft; version a0662b56-fde8-4583-ba65-db143610894d
31	3500-3550	DROP	Observed MD 3480.0-3500.0 ft; median GR 65.260 API; calibrated center 1462.300 ft TVD; estimated relative position -7.370 ft; version 2ace2058-5117-44fa-8fd1-580f1a44d1a0
32	3550-3600	DROP	Observed MD 3530.0-3550.0 ft; median GR 64.580 API; calibrated center 1462.640 ft TVD; estimated relative position -7.710 ft; version 01b9af16-5a02-4b09-99af-7dc1c5fc8d3c
33	3600-3650	DROP	Observed MD 3580.0-3600.0 ft; median GR 64.111 API; calibrated center 1462.874 ft TVD; estimated relative position -7.945 ft; version 47570299-bbe4-4dbb-828b-dd08fea4f928
34	3650-3700	DROP	Observed MD 3630.0-3650.0 ft; median GR 63.533 API; calibrated center 1463.163 ft TVD; estimated relative position -8.234 ft; version 262e3c09-543a-489f-a2e8-97c22119b882
35	3700-3750	DROP	Observed MD 3680.0-3700.0 ft; median GR 63.245 API; calibrated center 1463.307 ft TVD; estimated relative position -8.377 ft; version 86cc0de2-eec5-4b2e-a48d-1dcb46393eda
36	3750-3800	DROP	Observed MD 3730.0-3750.0 ft; median GR 62.478 API; calibrated center 1463.691 ft TVD; estimated relative position -8.761 ft; version ad06b41c-d075-4b68-8fe2-d5567f2e3769
37	3800-3850	DROP	Observed MD 3780.0-3800.0 ft; median GR 62.333 API; calibrated center 1463.763 ft TVD; estimated relative position -8.834 ft; version 2e06fcc1-6c97-4ede-921c-4f24ed4341c3
38	3850-3900	DROP	Observed MD 3830.0-3850.0 ft; median GR 61.556 API; calibrated center 1464.152 ft TVD; estimated relative position -9.222 ft; version b46fe4a8-9149-456f-91e1-1eac87522eac
39	3900-3950	DROP	Observed MD 3880.0-3900.0 ft; median GR 58.164 API; calibrated center 1465.848 ft TVD; estimated relative position -10.918 ft; version 86969d1b-fc20-4d6a-897f-de6d2325aedb

Step	MD interval (ft)	Action	Evidence / interpretation version
40	3950-4000	DROP	Observed MD 3930.0-3950.0 ft; median GR 48.912 API; calibrated center 1470.474 ft TVD; estimated relative position -15.544 ft; version c2b5b4ad-4881-442f-b232-409e78678ade
41	4000-4050	DROP	Observed MD 3980.0-4000.0 ft; median GR 36.691 API; calibrated center 1476.584 ft TVD; estimated relative position -21.654 ft; version 21e20527-054c-4b39-8dce-2e34ec700daa
42	4050-4100	DROP	Observed MD 4030.0-4050.0 ft; median GR 23.871 API; calibrated center 1482.798 ft TVD; estimated relative position -27.869 ft; version 21a51d9e-a0bd-4611-b9aa-358304425250
43	4100-4150	DROP	Observed MD 4080.0-4100.0 ft; median GR 19.942 API is saturated; center unresolved; retained last constrained interpretation; version cffa2936-18a1-44ef-8eb4-b84e3ef5f546
44	4150-4200	DROP	Observed MD 4130.0-4150.0 ft; median GR 20.083 API is saturated; center unresolved; retained last constrained interpretation; version 704f393d-1863-4928-9892-7bad25b2c30d
45	4200-4250	DROP	Observed MD 4180.0-4200.0 ft; median GR 19.956 API is saturated; center unresolved; retained last constrained interpretation; version cba10158-d159-41c6-9935-956c64e76c51
46	4250-4300	DROP	Observed MD 4230.0-4250.0 ft; median GR 20.005 API is saturated; center unresolved; retained last constrained interpretation; version 5543c656-e7bf-4d94-9779-6989dcc67561
47	4300-4350	DROP	Observed MD 4280.0-4300.0 ft; median GR 19.942 API is saturated; center unresolved; retained last constrained interpretation; version 5f640e99-e376-41d0-9dcc-c736e42e5336
48	4350-4400	DROP	Observed MD 4330.0-4350.0 ft; median GR 19.891 API is saturated; center unresolved; retained last constrained interpretation; version bc63bb62-7d76-4138-8ecb-50ffece65dfd
49	4400-4450	DROP	Observed MD 4380.0-4400.0 ft; median GR 20.144 API is saturated; center unresolved; retained last constrained interpretation; version 053d68c0-244e-41fb-8c17-458da4823c5c
50	4450-4500	DROP	Observed MD 4430.0-4450.0 ft; median GR 19.942 API is saturated; center unresolved; retained last constrained interpretation; version 4569c3e0-b550-47df-b541-b03535aff33a
51	4500-4550	DROP	Observed MD 4480.0-4500.0 ft; median GR 20.077 API; calibrated center 1483.891 ft TVD; estimated relative position -28.962 ft; version a5bdc038-6690-49fb-8dfb-d35123dd3408
52	4550-4600	DROP	Observed MD 4530.0-4550.0 ft; median GR 19.945 API is saturated; center unresolved; retained last constrained interpretation; version 5f25214e-9376-46a0-8f8d-6b08f35c7b7f
53	4600-4650	DROP	Observed MD 4580.0-4600.0 ft; median GR 19.816 API is saturated; center unresolved; retained last constrained interpretation; version 1492c3c4-8d82-47b5-ba71-7f3133ca8fdd
54	4650-4700	DROP	Observed MD 4630.0-4650.0 ft; median GR 20.053 API is saturated; center unresolved; retained last constrained interpretation; version 362c7fcd-5213-4ae7-a5e9-dd2a8dd74bb2
55	4700-4750	DROP	Observed MD 4680.0-4700.0 ft; median GR 20.007 API is saturated; center unresolved; retained last constrained interpretation; version 007dfa52-ea12-4509-af3a-ca17736ae9ca
56	4750-4800	DROP	Observed MD 4730.0-4750.0 ft; median GR 19.992 API is saturated; center unresolved; retained last constrained interpretation; version db787645-7b0c-4348-916b-628de698517d

Step	MD interval (ft)	Action	Evidence / interpretation version
57	4800-4850	DROP	Observed MD 4780.0-4800.0 ft; median GR 19.883 API is saturated; center unresolved; retained last constrained interpretation; version 2701bb9d-5526-44d2-bfc6-cc2f01283376
58	4850-4900	DROP	Observed MD 4830.0-4850.0 ft; median GR 20.114 API is saturated; center unresolved; retained last constrained interpretation; version 27d18442-5161-49d4-9e11-cb4bd6187af6
59	4900-4950	DROP	Observed MD 4880.0-4900.0 ft; median GR 20.030 API is saturated; center unresolved; retained last constrained interpretation; version 8de09fd2-33df-4407-aefd-7e9b75ea3437
60	4950-5000	DROP	Observed MD 4930.0-4950.0 ft; median GR 19.710 API is saturated; center unresolved; retained last constrained interpretation; version 163ab541-ed13-45ba-a75e-e3344921ccc5
61	5000-5050	DROP	Observed MD 4980.0-5000.0 ft; median GR 19.944 API is saturated; center unresolved; retained last constrained interpretation; version 846582de-6d20-4136-b212-d992cc00387a
62	5050-5100	DROP	Observed MD 5030.0-5050.0 ft; median GR 19.860 API is saturated; center unresolved; retained last constrained interpretation; version b4a0e339-d408-48fe-a22c-d4708664d284
63	5100-5150	DROP	Observed MD 5080.0-5100.0 ft; median GR 20.118 API is saturated; center unresolved; retained last constrained interpretation; version be28cf7e-24cc-4064-be2f-8da1f98117fb
64	5150-5200	DROP	Observed MD 5130.0-5150.0 ft; median GR 20.051 API is saturated; center unresolved; retained last constrained interpretation; version 40d3f67c-85ef-4d72-b0d0-2355ef6ca99f
65	5200-5250	DROP	Observed MD 5180.0-5200.0 ft; median GR 20.009 API is saturated; center unresolved; retained last constrained interpretation; version b1a919e8-a1b4-4db3-b6f1-0107e184c79e
66	5250-5300	DROP	Observed MD 5230.0-5250.0 ft; median GR 20.047 API is saturated; center unresolved; retained last constrained interpretation; version a3d15890-b507-4adf-8be3-d1d3b3deb5b2
67	5300-5350	DROP	Observed MD 5280.0-5300.0 ft; median GR 20.204 API is saturated; center unresolved; retained last constrained interpretation; version d6bea12b-6232-4e41-a8d1-1f5ef39e41a8
68	5350-5400	DROP	Observed MD 5330.0-5350.0 ft; median GR 19.969 API is saturated; center unresolved; retained last constrained interpretation; version 428e73f3-60de-4be7-ba92-04a3f7e83a92
69	5400-5450	DROP	Observed MD 5380.0-5400.0 ft; median GR 20.103 API is saturated; center unresolved; retained last constrained interpretation; version d27fce01-b0c1-4608-884d-09d70c1bae00
70	5450-5500	DROP	Observed MD 5430.0-5450.0 ft; median GR 20.088 API is saturated; center unresolved; retained last constrained interpretation; version cfc35e8a-7c08-41b2-8d4b-8af6a64c2887
71	5500-5550	DROP	Observed MD 5480.0-5500.0 ft; median GR 20.031 API is saturated; center unresolved; retained last constrained interpretation; version a45f05aa-c2ad-42d3-80a1-99fde1141741
72	5550-5600	DROP	Observed MD 5530.0-5550.0 ft; median GR 19.936 API is saturated; center unresolved; retained last constrained interpretation; version e2c90aca-3ff6-4385-89a1-bff21011fe52
73	5600-5650	DROP	Observed MD 5580.0-5600.0 ft; median GR 20.161 API is saturated; center unresolved; retained last constrained interpretation; version 2c463290-41f8-477b-8bb7-1656dd773a4c

Step	MD interval (ft)	Action	Evidence / interpretation version
74	5650-5700	DROP	Observed MD 5630.0-5650.0 ft; median GR 20.131 API is saturated; center unresolved; retained last constrained interpretation; version 18ec611c-14f6-4ad6-a7d3-d4225f49411c
75	5700-5750	DROP	Observed MD 5680.0-5700.0 ft; median GR 19.966 API is saturated; center unresolved; retained last constrained interpretation; version a61c1a53-1f57-4b51-bd91-1ebef7bf31bd
76	5750-5800	DROP	Observed MD 5730.0-5750.0 ft; median GR 20.101 API is saturated; center unresolved; retained last constrained interpretation; version 43815c86-9a28-4b47-bfb3-5c4461227aab
77	5800-5850	DROP	Observed MD 5780.0-5800.0 ft; median GR 19.918 API is saturated; center unresolved; retained last constrained interpretation; version 8dc1d9ab-c336-4863-bc66-d875f85dde1b
78	5850-5900	DROP	Observed MD 5830.0-5850.0 ft; median GR 19.898 API is saturated; center unresolved; retained last constrained interpretation; version b2739ec0-0b5e-4384-8a2b-1251323c03c6
79	5900-5950	DROP	Observed MD 5880.0-5900.0 ft; median GR 20.163 API is saturated; center unresolved; retained last constrained interpretation; version 58c2183b-d91c-4291-8c89-b6f481a98eff
80	5950-6000	DROP	Observed MD 5930.0-5950.0 ft; median GR 20.121 API is saturated; center unresolved; retained last constrained interpretation; version 71548d81-de7a-4761-91e5-a739a824da9c
81	6000-6050	DROP	Observed MD 5980.0-6000.0 ft; median GR 20.064 API is saturated; center unresolved; retained last constrained interpretation; version 38e5bd15-8e17-4b21-9963-5d94b0390504
82	6050-6100	DROP	Observed MD 6030.0-6050.0 ft; median GR 20.097 API is saturated; center unresolved; retained last constrained interpretation; version 57cb6093-2745-47d1-b4dc-d2cc60cd999c
83	6100-6150	DROP	Observed MD 6080.0-6100.0 ft; median GR 20.179 API is saturated; center unresolved; retained last constrained interpretation; version 383a1b2b-f5b5-4903-ae3a-d650e6ae4781
84	6150-6200	DROP	Observed MD 6130.0-6150.0 ft; median GR 20.028 API is saturated; center unresolved; retained last constrained interpretation; version 51ccccf5-b725-41b4-a08f-c53614027347
85	6200-6250	DROP	Observed MD 6180.0-6200.0 ft; median GR 20.035 API is saturated; center unresolved; retained last constrained interpretation; version a15091e6-d52f-4fd9-94ec-4868537841e5
86	6250-6300	DROP	Observed MD 6230.0-6250.0 ft; median GR 19.939 API is saturated; center unresolved; retained last constrained interpretation; version 25fbab3e-c6d9-4e33-8cbc-be1d92c40849
87	6300-6350	DROP	Observed MD 6280.0-6300.0 ft; median GR 19.903 API is saturated; center unresolved; retained last constrained interpretation; version 896ea44b-5ae0-4378-bde0-f5c1ec309551
88	6350-6400	DROP	Observed MD 6330.0-6350.0 ft; median GR 19.898 API is saturated; center unresolved; retained last constrained interpretation; version b8fcd467-b260-4390-8c00-ee8b43c29b43
89	6400-6450	DROP	Observed MD 6380.0-6400.0 ft; median GR 19.916 API is saturated; center unresolved; retained last constrained interpretation; version 462665eb-5506-42a5-af18-f6927195502e
90	6450-6500	DROP	Observed MD 6430.0-6450.0 ft; median GR 20.237 API is saturated; center unresolved; retained last constrained interpretation; version d2123933-11c6-4731-80ae-c289bc58f973

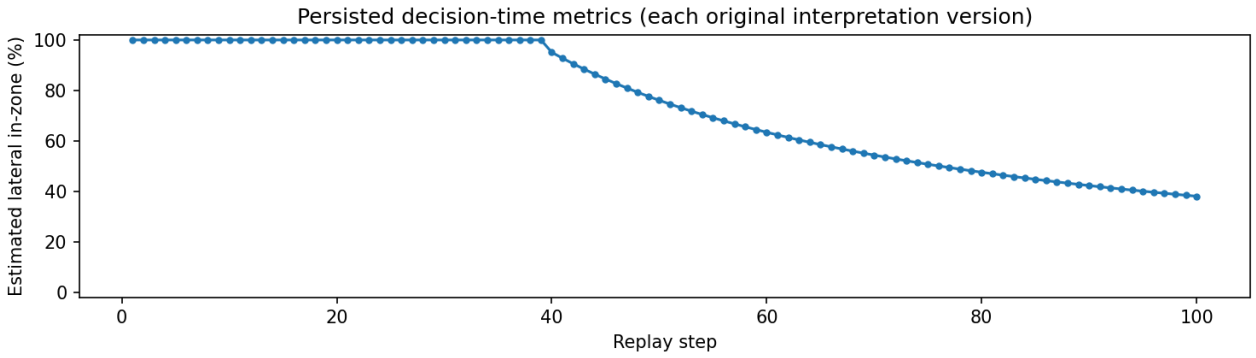
Step	MD interval (ft)	Action	Evidence / interpretation version
91	6500-6550	DROP	Observed MD 6480.0-6500.0 ft; median GR 20.134 API is saturated; center unresolved; retained last constrained interpretation; version 94423058-74b9-4704-8b88-19571c734479
92	6550-6600	DROP	Observed MD 6530.0-6550.0 ft; median GR 20.050 API is saturated; center unresolved; retained last constrained interpretation; version 1ff82f28-1ba5-4292-b138-e110d15d177c
93	6600-6650	DROP	Observed MD 6580.0-6600.0 ft; median GR 20.166 API is saturated; center unresolved; retained last constrained interpretation; version 192daa12-a64a-46df-8e28-d3606bd003ec
94	6650-6700	DROP	Observed MD 6630.0-6650.0 ft; median GR 20.049 API is saturated; center unresolved; retained last constrained interpretation; version b375cfd5-e8c9-47c1-9659-b685cabaa957
95	6700-6750	DROP	Observed MD 6680.0-6700.0 ft; median GR 19.876 API is saturated; center unresolved; retained last constrained interpretation; version a1a853ab-d6c7-4b99-b520-4a9f06416a18
96	6750-6800	DROP	Observed MD 6730.0-6750.0 ft; median GR 20.162 API; calibrated center 1483.905 ft TVD; estimated relative position -28.975 ft; version 4d64f155-efc4-4b69-a952-13ae5bf43bc5
97	6800-6850	DROP	Observed MD 6780.0-6800.0 ft; median GR 19.934 API is saturated; center unresolved; retained last constrained interpretation; version 7172f941-637c-448e-8b63-cd2115be34ca
98	6850-6900	DROP	Observed MD 6830.0-6850.0 ft; median GR 20.072 API is saturated; center unresolved; retained last constrained interpretation; version 983ae23b-5588-4b92-8eec-9d0643434918
99	6900-6950	DROP	Observed MD 6880.0-6900.0 ft; median GR 19.880 API is saturated; center unresolved; retained last constrained interpretation; version a3892825-4a41-43f3-ae67-e207698d1200
100	6950-7000	DROP	Observed MD 6930.0-6950.0 ft; median GR 20.065 API is saturated; center unresolved; retained last constrained interpretation; version 0f00dc84-2d75-4576-bc1e-a5e475a2d0d5

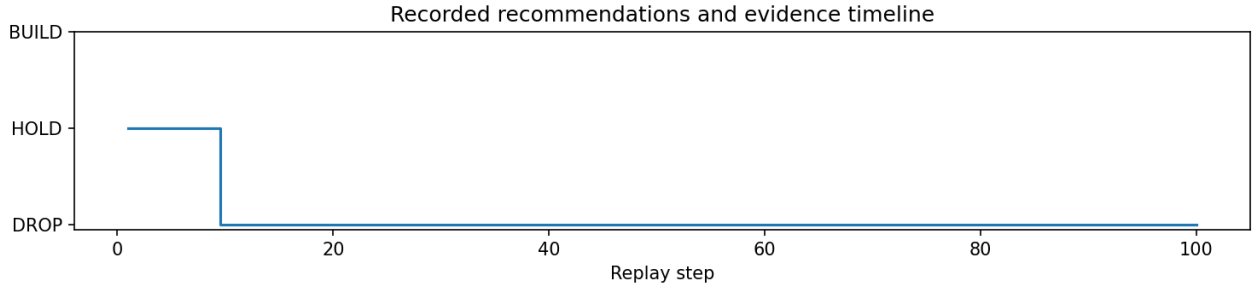
Step	Revealed MD (ft)	Estimated in-zone (%)	Mean center distance (ft)
1	2050	100.000	0.199
2	2100	100.000	0.275
3	2150	100.000	0.354
4	2200	100.000	0.466
5	2250	100.000	0.593
6	2300	100.000	0.732
7	2350	100.000	0.850
8	2400	100.000	0.975
9	2450	100.000	1.107
10	2500	100.000	1.228
11	2550	100.000	1.363
12	2600	100.000	1.485
13	2650	100.000	1.606
14	2700	100.000	1.736

Step	Revealed MD (ft)	Estimated in-zone (%)	Mean center distance (ft)
15	2750	100.000	1.861
16	2800	100.000	1.990
17	2850	100.000	2.122
18	2900	100.000	2.240
19	2950	100.000	2.368
20	3000	100.000	2.496
21	3050	100.000	2.626
22	3100	100.000	2.753
23	3150	100.000	2.882
24	3200	100.000	2.997
25	3250	100.000	3.134
26	3300	100.000	3.262
27	3350	100.000	3.380
28	3400	100.000	3.507
29	3450	100.000	3.632
30	3500	100.000	3.760
31	3550	100.000	3.879
32	3600	100.000	4.006
33	3650	100.000	4.131
34	3700	100.000	4.257
35	3750	100.000	4.378
36	3800	100.000	4.507
37	3850	100.000	4.625
38	3900	100.000	4.753
39	3950	100.000	4.942
40	4000	95.085	5.287
41	4050	92.766	5.790
42	4100	90.557	6.421
43	4150	88.451	6.925
44	4200	86.441	7.409
45	4250	84.520	7.874
46	4300	82.682	8.321
47	4350	80.923	8.752
48	4400	79.237	9.168
49	4450	77.620	9.569
50	4500	76.068	9.957
51	4550	74.576	10.326
52	4600	73.142	10.688

Step	Revealed MD (ft)	Estimated in-zone (%)	Mean center distance (ft)
53	4650	71.762	11.039
54	4700	70.433	11.379
55	4750	69.153	11.709
56	4800	67.918	12.029
57	4850	66.726	12.341
58	4900	65.576	12.643
59	4950	64.464	12.938
60	5000	63.390	13.225
61	5050	62.351	13.504
62	5100	61.345	13.776
63	5150	60.371	14.042
64	5200	59.428	14.302
65	5250	58.514	14.555
66	5300	57.627	14.802
67	5350	56.767	15.044
68	5400	55.932	15.281
69	5450	55.122	15.513
70	5500	54.334	15.739
71	5550	53.569	15.962
72	5600	52.825	16.179
73	5650	52.101	16.393
74	5700	51.397	16.602
75	5750	50.712	16.807
76	5800	50.045	17.009
77	5850	49.395	17.207
78	5900	48.761	17.402
79	5950	48.144	17.593
80	6000	47.542	17.781
81	6050	46.955	17.966
82	6100	46.383	18.148
83	6150	45.824	18.327
84	6200	45.278	18.503
85	6250	44.746	18.676
86	6300	44.225	18.847
87	6350	43.717	19.016
88	6400	43.220	19.182
89	6450	42.735	19.345
90	6500	42.260	19.507

Step	Revealed MD (ft)	Estimated in-zone (%)	Mean center distance (ft)
91	6550	41.796	19.666
92	6600	41.341	19.823
93	6650	40.897	19.978
94	6700	40.462	20.131
95	6750	40.036	20.282
96	6800	39.619	19.066
97	6850	39.210	19.171
98	6900	38.810	19.276
99	6950	38.418	19.381
100	7000	38.034	19.486

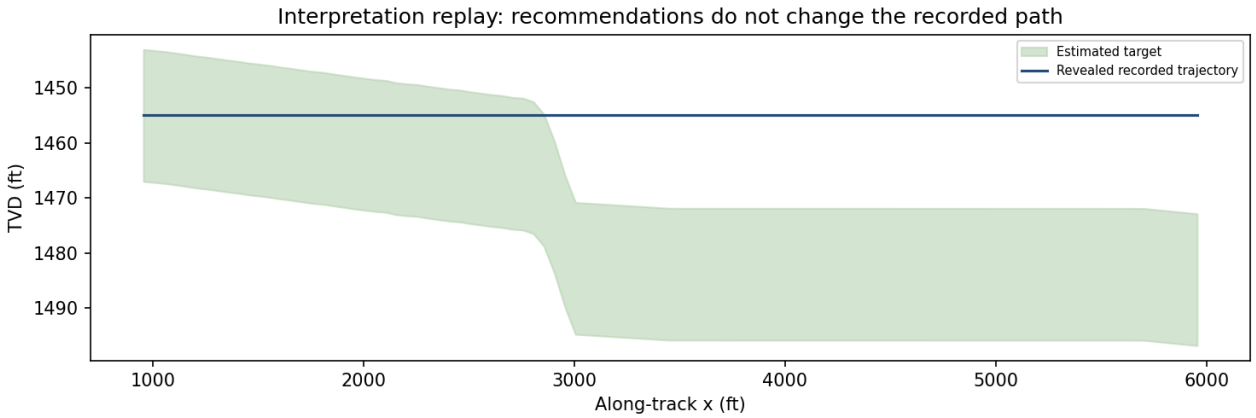




Final interpretation

Interpretation version: 0f00dc84-2d75-4576-bc1e-a5e475a2d0d5; rationale: Saturated synthetic GR supplies only a directional bound, not a unique horizon pick

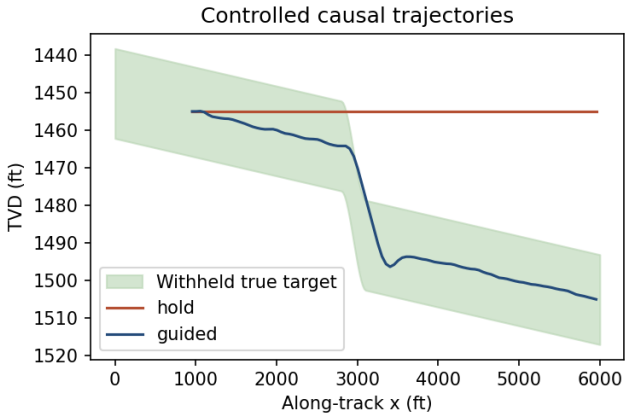
Assumed uncertainty band (ft): 30.0. This scenario-assumed range is not a calibrated statistical confidence interval.

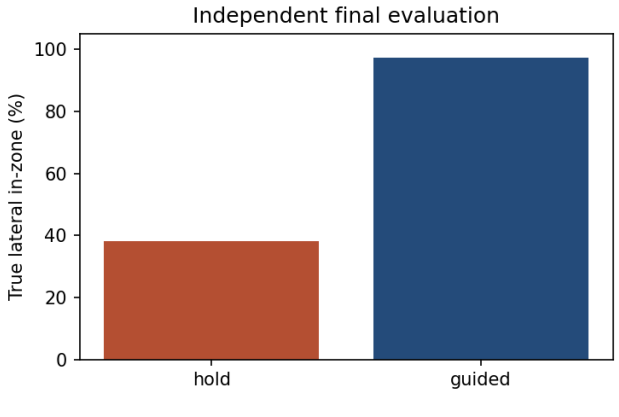


Independent evaluation

Withheld geological truth was used only after the replay completed. Replay evaluation measures interpretation and fixed-path placement, not steering efficacy.
interpretation_error: {'baseline_interpretation_mean_absolute_error_ft': 14.999161207741123,
'final_interpretation_mean_absolute_error_ft': 8.081542794026898}
lateral_start_md_ft: 2000.0
limitation: Recommendations did not change this fixed recorded trajectory
metric_basis: withheld_truth
metrics: {'avg_center_distance_ft': 27.52464829587919, 'dls_violation_count': 0, 'evaluated_length_ft': 5000.0, 'in_zone_length_ft': 1903.5810398298531, 'integration_step_max_ft': 1.0, 'max_dls_deg_per_100ft': 0.0, 'max_overshoot_ft': 38.000000000000455, 'percent_in_zone': 38.07162079659706}
mode: replay
run_id: 4eb607b4-68a4-48fa-b0ea-8af5a5fb8f30
scenario_version: structural_dip_01-v1
seed: 123
truth_input_sha256: 2858aa37ab5ade3fe879967dbadc19380ae18d788fa1798f8bc0efdd0ccb6a8f
truth_sha256: 2858aa37ab5ade3fe879967dbadc19380ae18d788fa1798f8bc0efdd0ccb6a8f

Causal strategy	True in-zone (%)	In-zone / evaluated length (ft)	Maximum lateral DLS
guided	97.174	4858.7 / 5000.0	3.0000
hold	38.072	1903.6 / 5000.0	0.0000





Assumptions and limitations

Synthetic calibration: GR = 80 + 2*(TVD - target center) API, clipped to 20-160 API, with 0.6 API Gaussian noise. This deliberately signed layer signal is known to the synthetic operator; real gamma-ray inversion does not generally provide this information. Saturation cannot identify an exact center and is logged as unresolved evidence.

Scoring: estimated zones use exact piecewise-linear MD interval integration. Nonlinear withheld geology uses at most 1-ft intervals with boundary-crossing interpolation; reference refinement to 0.1 ft changes in-zone results by less than 0.001 percentage points. The final-point indicator is not an interval-length percentage.

Coordinates: feet; MD along the well, local TVD positive down, along-track x eastward. Minimum-curvature integration uses survey inclination and azimuth. Layer metrics are length weighted over the lateral interval with an explicit evaluated-length denominator.

The operator baseline uses offset picks only. Subsequent interpretations may use only revealed active measurements. Geological truth remains fixed and is isolated from live interpretations and recommendations.

Causal trials share geology, initial state, seed and trajectory constraints. HOLD/BUILD/DROP use a simplified bounded kinematic response. Report measured outcomes, including failure; no production drilling, sensor physics or operational safety claims are made.

Idealized 2D geology and synthetic GR/resistivity response; sparse offsets and assumed uncertainty. No real-time telemetry or WITSML support. Numerical summaries are reproducible; PDF timestamps and run identifiers can differ.