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: a9991c26-cbd2-4f35-a1b0-966157b083b4
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)

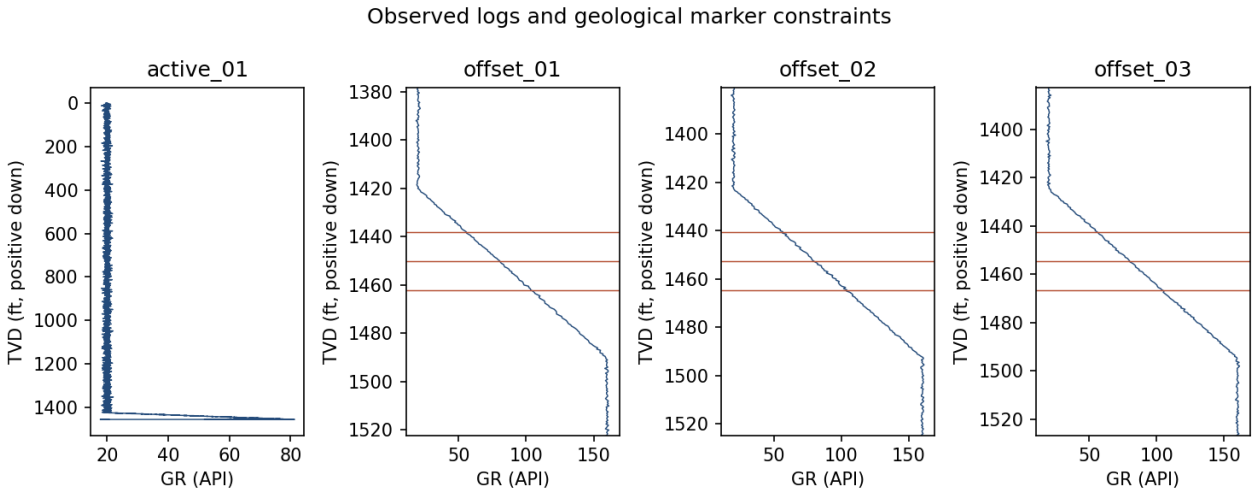
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Correlation and markers

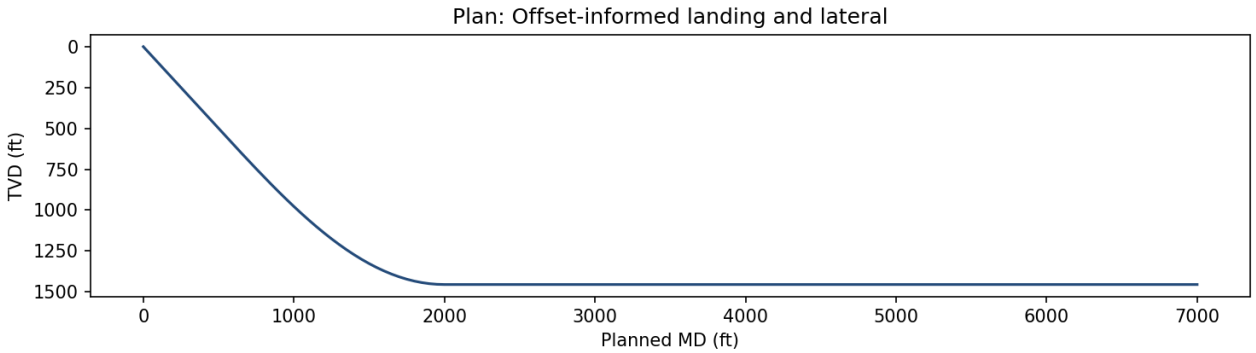
Offset formation picks constrain a regional estimate in shared along-track x and local TVD. Active observations and markers are limited to the saved revealed depth.

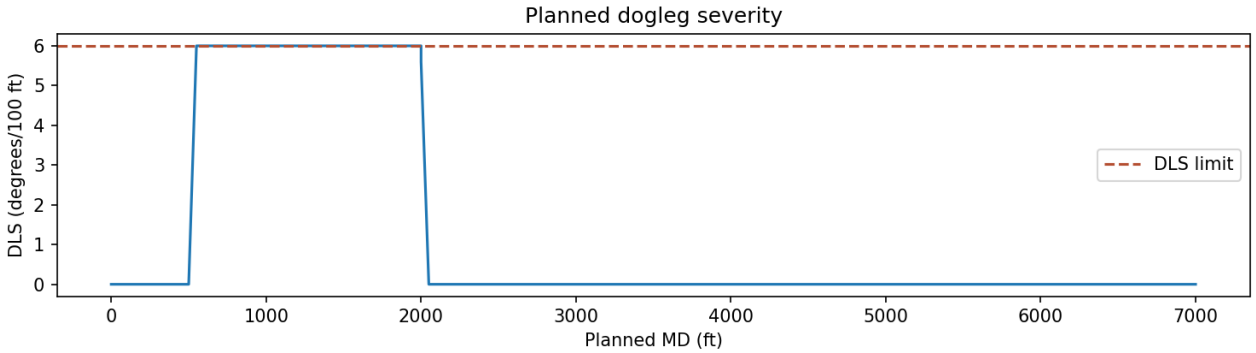
Well	Marker	MD (ft)
offset_01	Top_A	1438.16
offset_01	Mid_A	1450.16
offset_01	Base_A	1462.16
offset_02	Top_A	1440.66
offset_02	Mid_A	1452.66
offset_02	Base_A	1464.66
offset_03	Top_A	1442.66
offset_03	Mid_A	1454.66
offset_03	Base_A	1466.66



Pre-spud plan and DLS

Plan name: Offset-informed landing and lateral; Plan ID: 615d5570-b6fa-4bde-9d58-fe08707407b0
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 e45d3ae1-3eeb-4fa9-8293-f5c130091666
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 51c50aea-43e3-43c7-b095-2cf84ccbf66b
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 c1b84ca1-631e-4a4e-901a-b7ff0ccd1944
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 a44fd3a8-9fdc-496e-b234-9c65be843fe1
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 aaee17be-7f67-4924-997b-c3b9aeaa3f28
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 5caf5056-02ef-4151-be9d-ae7c6315d6f4
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 54ff9612-3bfd-4a66-be2b-25541df55473

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 f8f6d489-acc4-42e8-9aa2-5b9be2853e86
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 785e15c6-1d38-4064-9e19-8f032b363f24
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 a9fa1d97-aff5-4be4-af50-b4f73f631d77
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 0b460c62-e905-4e9d-9880-14cf6f2bae06
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 3e30ece1-4472-48e0-9ba0-1137bcc30a24
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 37dc86ed-b7df-40a0-8eec-39b8d6123408
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 2db8d580-49bd-47b3-ac71-c20dfd3988d0
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 680e0696-bd47-4b88-8571-960781291668
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 f33bd813-aa23-4dc5-9340-e3520d9ea052
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 942ca0d8-ca6c-4b43-a14c-decd8e46d5b5
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 4eed3af2-616a-410a-8073-1d1ae7632c3d
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 95f42370-3695-4b40-8042-fc5b49f7bc84
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 675d1dd6-21cd-45fa-98fa-7527ebebf528
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 1f908ec0-d223-4171-acff-7df663b7966c
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 14960405-de75-4ea7-b999-fc5b40610b2d
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 d071c6e8-737f-4f3a-9073-f68ab2a81a62

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 37588896-18b0-4afb-b210-d4d34a8d98b2
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 be774457-6a0a-475f-984a-3b10acec51b3
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 02c19633-310c-4867-9373-79c2221a7324
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 9321e35c-5b37-499a-b3c0-21eef5a2b40f
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 0ed34590-6fb7-4e30-9ae6-3a47bfde89c2
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 355d58b3-21e3-4d1b-8ef2-61534e651777
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 4ae10b2e-c7cc-44ab-ac7e-4ef8acdc1691
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 fca6ca86-61f9-4463-917d-67464f56e50e
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 2c41aa14-c8dd-42dd-8b10-847ad5d72c7c
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 8241bd2c-b736-4e1b-908e-d6c294970dea
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 ee2559fa-b851-41d1-b731-7c4745deed31
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 8d5f86b3-9d8a-4c3a-813e-105ad2e74672
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 4f98e355-f58a-49cc-b8a1-c182f7d59c66
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 9744770b-5c4f-4950-a616-e788b0bfd8a4
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 cba96812-9860-48b7-9173-2b073dd0443b
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 58e74b0c-61a6-4b93-aead-831642459513

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 4464e509-4006-4840-9203-e0d96c6b8f60
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 56826f7e-5f6e-4633-815a-87d4078206c1
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 34f34652-2e6c-48a4-8550-96d31abd7414
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 f46e72bc-dd64-4777-9cf2-a2121cef0b58
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 6b9b6503-1c07-469b-84a2-02077f8f089a
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 ed65a2a0-fb21-4ff0-90c4-bc93f65fab44
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 5dac47a3-6a3f-4a8a-881c-bc68e3bc2df9
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 cb2a7dff-1c90-4ae3-b2fb-aa59b4cff0a8
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 830f7a54-279f-4085-8cee-9f4a45d131f4
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 f1cac051-9cf9-40c5-9661-dbd8214574b0
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 b0a8d738-db5e-46ba-8d2b-8387f7e5f969
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 77b273af-48a7-4843-8e73-04ad0812d9ec
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 326477cd-f53e-4aeb-bf41-053c13decc11
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 c4d2934d-2953-4baa-b3d2-c5b3cdbb2c20
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 38eb23d4-6a23-4dac-a4b0-1200db2aac62
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 eac2d437-3abc-4e3e-92ba-af503cd34f15
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 7f98aa1a-50cf-480c-937b-a004367c249c
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 7a012e5d-8d27-47b0-b618-64bc13d62810

Step	MD interval (ft)	Action	Evidence / interpretation version
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 8d63ee2e-a15d-406d-a4bd-4886cd2ce31b
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 c3f48ecd-2aab-40d8-a72f-889bf9f5d7b2
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 8aa3e0f7-e60b-4978-b561-d80883a358d4
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 8384f3be-a2b0-4a4c-8cd4-11e868a666cf
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 c5c29d31-a6db-41eb-ab8c-00cdb4270e29
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 1c9e9f41-5e0c-45f2-896e-63f8f5dd5324
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 8a5a778a-ca6d-471a-929d-a37be9384f41
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 c41dbba5-f7e1-4562-9491-cae596168fe6
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 a7bafd10-5748-490d-b1f8-b70a3194861a
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 e51cac25-ba90-4c0c-98ed-4704d34e5535
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 4bf6d341-84bb-487b-918f-00422ef92752
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 ec38e89d-56db-4781-baa9-cd14a9415a41
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 5e4121c4-92a8-4ada-862c-fb981119c2b0
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 265f0860-7997-44b1-8620-71ab2655b77b
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 d67d41f8-a526-4730-9493-b6495111ce50
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 e4d9ab48-3236-4525-a3f1-0f07f478134b
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 4b6b0c71-79ea-426a-8eee-e4959bd6ee87

Step	MD interval (ft)	Action	Evidence / interpretation version
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 f6f4ffd2-d381-4cb1-98ed-ff19e7c5f263
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 e204352c-c8eb-498f-86a0-628e04410ef0
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 e0de7d98-40e5-464e-af5e-14c7eba9b3e7
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 1418fc2b-f787-4ff4-b9dc-f9daf15db8e7
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 c11e319e-e91d-433d-ac5f-6d82bf12f262
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 4da810b0-8be2-4c77-ad80-99d9876f6c03
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 5ecc942c-ee04-42b6-beed-ee3779866a91
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 75869ed8-2d69-4d1b-8fa0-bd5242a5360b
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 9845994f-ac9e-4c03-9da9-08b9b3f3ab06
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 1fcc7fa4-5bb7-4a20-b88e-2d9bfa403d1c
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 8caf3107-78e6-4f87-8dc3-6aafe9da5199
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 27c4ce4f-b7b0-4ffc-a1c9-2afad3153528
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 698a18a9-c03a-470a-87bd-670c429f7f92
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 be7f63c0-84e8-4d2a-a044-cd2fe11f7f14
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 4c6df509-b6de-4778-b4d0-70b23d656e13
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 70c86943-84a7-4126-98e9-8539e8eb2ea1
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 215b2fd0-063a-42d9-bef3-fb3af491379c
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 f879a0e1-f266-4d70-b40d-94174ef3a3f1

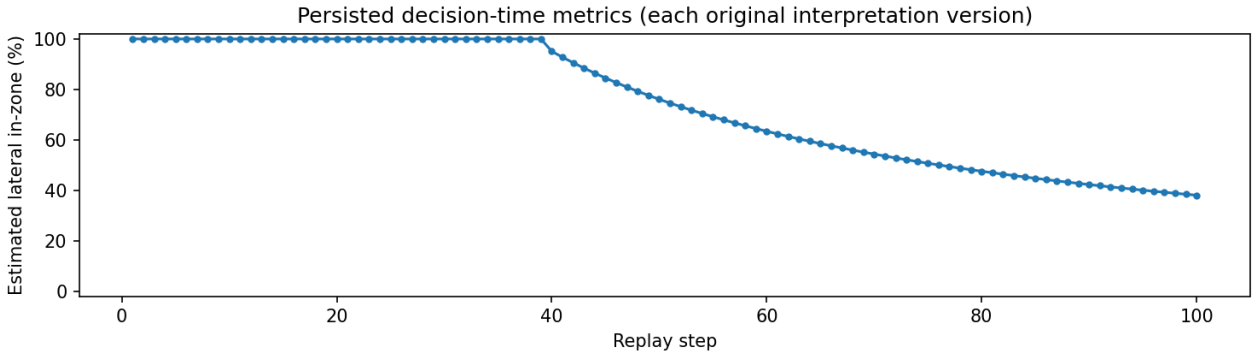
Step	MD interval (ft)	Action	Evidence / interpretation version
93	6600-6650	DROP	Observed MD 6580.0-6600.0 ft; median GR 20.166 API is saturated; center unresolved; retained last constrained interpretation; version 4d5c47f9-bd03-4166-a287-5a19787136cf
94	6650-6700	DROP	Observed MD 6630.0-6650.0 ft; median GR 20.049 API is saturated; center unresolved; retained last constrained interpretation; version 411e1305-8580-4cdc-94a5-36e7c970321b
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 ad63b497-81c4-442a-aba0-d2dcb7df3af9
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 ad68be07-46bd-431a-8c57-7ff50e5eabaf
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 dd56f031-6b46-48f8-8259-8b4651d1569c
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 435da5f5-85da-4842-9f22-b90969a00f04
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 0b35352d-0897-4d1d-a447-c38753db7127
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 9c911f65-96a3-4a03-b815-ec469ab1f734

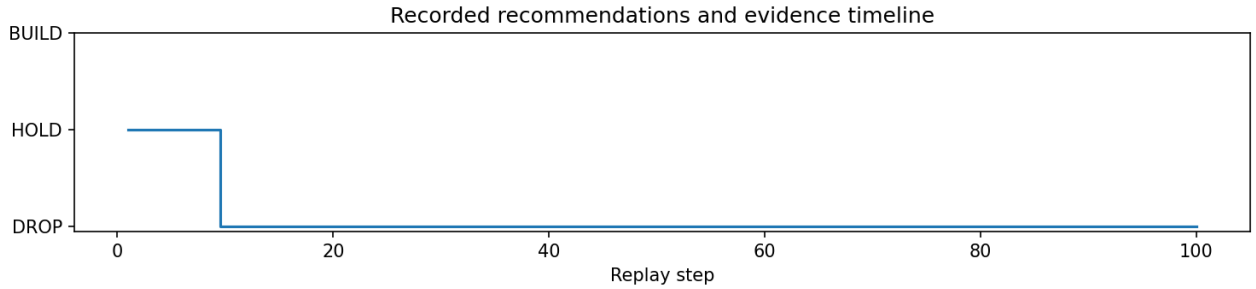
Step	Revealed MD (ft)	Estimated in-zone (%)	Mean center distance (ft)
1	2050	100.000	0.199
2	2100	100.000	0.275
3	2150	100.000	0.354
4	2200	100.000	0.466
5	2250	100.000	0.593
6	2300	100.000	0.732
7	2350	100.000	0.850
8	2400	100.000	0.975
9	2450	100.000	1.107
10	2500	100.000	1.228
11	2550	100.000	1.363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

Step	Revealed MD (ft)	Estimated in-zone (%)	Mean center distance (ft)
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
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

Step	Revealed MD (ft)	Estimated in-zone (%)	Mean center distance (ft)
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
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

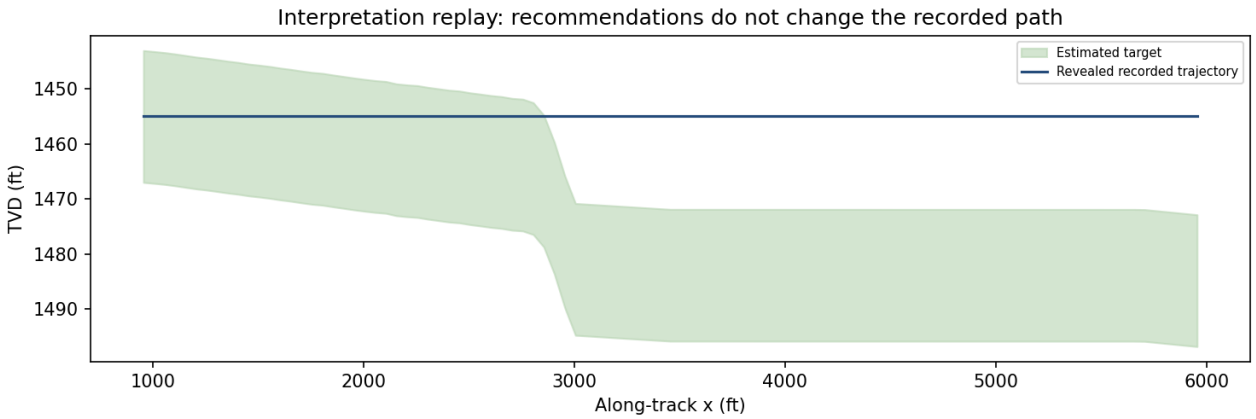
Step	Revealed MD (ft)	Estimated in-zone (%)	Mean center distance (ft)
96	6800	39.619	19.066
97	6850	39.210	19.171
98	6900	38.810	19.276
99	6950	38.418	19.381
100	7000	38.034	19.486





Final interpretation

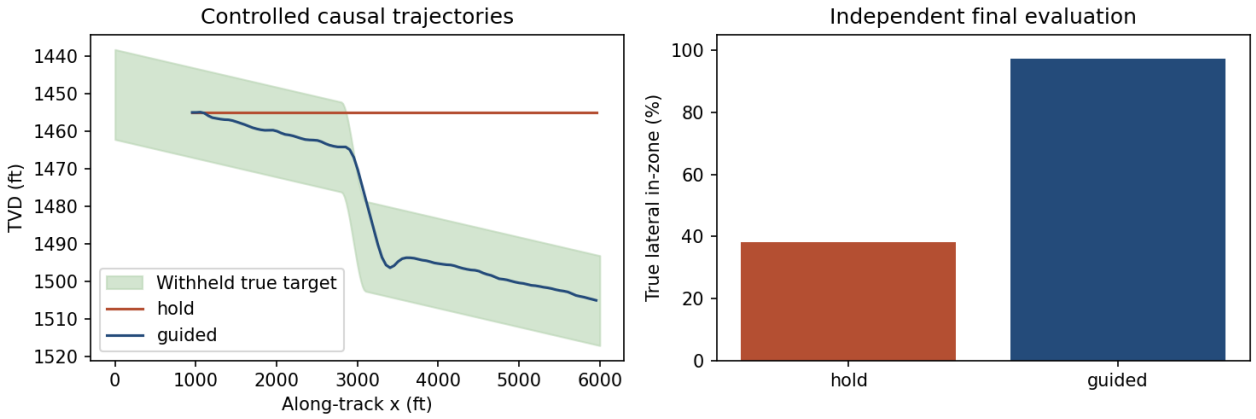
Interpretation version: 9c911f65-96a3-4a03-b815-ec469ab1f734; rationale: Saturated synthetic GR supplies only a directional bound, not a unique horizon pick
Assumed uncertainty band (ft): 30.0. This scenario-assumed range is not a calibrated statistical confidence interval.



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: a9991c26-cbd2-4f35-a1b0-966157b083b4
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.