

Survey

Client: Northwest Natural Gas Corporation	Survey Computation Method: Minimum Curvature
Field: N01 Mist Field, OR	DLS Computation Method: Lubinski
Structure: Mist Gas Storage Field	Vertical Section Azimuth: 233.000°
Well: OM 32-22-65	Vertical Section Origin: N 0.000 ft, E 0.000 ft
Borehole: OM 32	TVD Reference: Kelly Bushing
API #: 0360090032700	773.0 ft above Mean Sea Level
Date: July 27, 1998	Magnetic Declination: 18.542°
Grid Convergence: -1.97308967°	Total Field Strength: 54259.529 nT
Scale Factor: 0.99999807	Dip: 68.016°
Location: N 45 59 32.517, W 123 16 55 881	Declination Date: July 27, 1998
: N 860087.400 ftUS, E 1292945.400 ftUS	Magnetic Declination Model: BGS 1998
Coordinate System: NAD27 Oregon State Planes, Northern Zone, US Feet	North Reference: Grid North
	Coordinate Reference To: Well Head

Station ID	MD (ft)	Incl (°)	Azim (°)	TVD (ft)	VSec (ft)	N/S (ft)	E/W (ft)	Closure (ft)	at Azim (°)	DLS (°/100ft)	TF (°)
Tie-In	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-112.0MTF
	542.00	2.00	248.00	541.89	9.14	-3.54	-8.77	9.46	248.00	0.37	-118.0MTF
	632.00	6.00	242.00	631.65	15.30	-6.34	-14.38	15.72	246.21	4.46	-36.0
	695.00	9.00	229.00	694.11	23.47	-11.12	-21.01	23.77	242.11	5.44	3.7
	788.00	12.25	230.00	785.50	40.59	-22.24	-34.06	40.68	236.86	3.50	25.7
	850.00	13.75	233.00	845.91	54.52	-30.90	-44.99	54.58	235.51	2.65	20.3
	943.00	18.00	238.00	935.35	79.90	-45.17	-66.01	79.99	235.61	4.80	-60.2
	1004.00	19.00	233.00	993.20	99.22	-56.15	-81.93	99.32	235.58	3.07	0.0
	1143.00	20.00	233.00	1124.23	145.62	-84.07	-118.99	145.69	234.76	0.72	90.0
	1380.00	20.00	236.00	1346.94	226.63	-131.13	-184.96	226.72	234.67	0.43	-65.7
	1615.00	20.50	233.00	1567.42	307.91	-178.36	-251.14	308.04	234.62	0.49	159.8