Spatial Location

Well_ID

Unique identifier for each well.

X, Y, Z

Grid-index coordinates locating each sample in the 3D geological model

(Grid index units)

(The larger Z goes deeper downwards in the reservoir, the larger X goes to the right side, and the larger Y goes to the upside)

Elastic Velocities & Impedances

Vp — P-wave (compressional) velocity

Speed of compressional seismic waves through the rock

Units: m/s

Vs — S-wave (shear) velocity

Speed of shear seismic waves through the rock

Units: m/s

AI (Acoustic Impedance)

AI = ρ × Vp, controls seismic reflection strength

Units: kg/(m²·s)

SI (Shear Impedance)

SI = ρ × Vs, sensitive to lithology and rock stiffness

Units: kg/(m²·s)

Density Properties

rho_b — *Bulk density*
Combined density of rock matrix and pore fluids
Units**:** g/cm³

rho_f — *Fluid density*
Density of pore fluid
Units: g/cm³
rho_m — *Matrix (mineral) density*
Density of solid mineral grains
Units: g/cm³

Rock Physics Moduli (Stiffness)

(All moduli are in gigapascals, GPa)

K0 — Mineral bulk modulus

Intrinsic stiffness of the mineral framework

G0 — Mineral shear modulus

Shear stiffness of the mineral framework

Kdry — Dry-rock bulk modulus

Bulk stiffness of rock frame without pore fluids

Gdry — Dry-rock shear modulus

Shear stiffness of rock frame without fluids

Kf — Fluid bulk modulus

Compressibility of the pore fluid

Ksat — Saturated bulk modulus

Bulk stiffness after fluid substitution

Gsat — Saturated shear modulus

Shear stiffness of fluid-saturated rock

Petrophysical Properties

phi (ϕ) — Porosity

Fraction of pore volume in the rock

Units: fraction (0–1)

perm — Permeability

Ability of rock to transmit fluids

Units: millidarcies (mD)

Gamma Ray

GR — Gamma Ray log

Measures natural radioactivity; proxy for clay content

Units: API

Facies — Rock-Type Interpretation

1	Moderately clean sandstone
2	Quartz arenite
3	Interbedded sandstone–shale
4	Shaly sandstone
5	Clay-rich shale
6	Compact calcareous/siliceous shale