Roduid: Unique identifier for the rod pump, specific for each pump

UWI: Unique Well identifier, specific for each well

NodeID: Unique Identifier

IDWELL: Unique ID

Tbguide: Unique ID

Lifetime\_start: Rod pump beginning or start time

Lifetime\_end: Rod pump ending time (when it fails or goes down?)

IDRECJOBPULL: Unique ID

REPORTTO: Failure Modes (Either Tubing issue or Sucker Rod Pump issue)

FAILSTART: only exists when REPORTTO exists and describes the time the issue was discovered

FAILURETYPE: Literally the same thing as REPORTTO, describes failure modes which are tubing and sucker rod pump

H2S\_CONCENTRATION: concentration of Hydrogen Sulfide which is extremely lethal and poisonous

PrimarySetpoint: probably pressure upper bound setpoints for the pump but unsure

SecondarySetpoint: probably pressure lower bound setpoints for the pump but unsure

StrokeLength: length traveled by rod when it moves up and down the site

GrossStrokeLength: Average length of rod stroke traveled during an established time of pumping?

Fillage: the amount of fluid entering the pump on each stroke. The pump speed can be adjusted or stopped to allow reservoir fluids to fill the well bore again. Essential to calculate the total amount of fluids produced by a well

YesterdaysAverageSPM: yesterdays average strokes per minute for the pump

bha\_configuration: bottomhole assembly, consists of categorical variables such as TAC\_ABOVE\_NIP, TAC\_BELOW\_NIP, PACKER\_DONNAN, and PACKER\_TAC\_DONNAN. TAC is a tubing anchor catcher which prevents the movement of tubing during the pumping cycle, nipples are sections of pipe that provide a seal and locking mechanism (can be on any section of the pipe), packers are downhole devices used in almost every completion to isolate the annulus from the production conduit, enabling controlled production, injection or treatment, Donnan idk but I saw something about the Gibbs-Donnan equilibrium effect which talks about issues with diffusion across a semi-permeable membrane so I am assuming it has something to do with that?

Chemgroup1\_any, chemgroup1\_all, chemgroup2\_any, chemgroup2\_all, chemgroup3\_any, chemgroup3\_all: idk but my best guess is that they are different hydrocarbon groups that were detected by GC downhole grouped by number of Carbon atoms (methane, ethane, propane)?

Max\_unguided\_dls: the maximum unguided dog leg severity which is basically a measure of the maximum amount of change in the inclination of the borehole usually expressed in degrees per 100 feet or 30m of course length. Basically if there is no guided interface for the drill bit in bha, how much does the angle of the rod change every 100 feet drilled.

Dls\_high\_in\_hole: dogleg severity in hole, don’t really understand the difference between this and max\_unguided\_dls but im guessing that it is an intermittent measurement at the time the data was pulled?

Gas\_anchor\_length: a gas anchor separates gas from fluid in the downhole assembly, makes it much easier and more efficient to pump fluid, available commercial at 20 or 40ft lengths so all values should be around those.

MAX\_INCLINATION: basically the maximum degrees of change between the 90 degree azimuth downhole for the drill and entry point for the rod pump.

Wellbore\_category: different types of wellbores- vertical, low tangent, high tangent, off lease

Manual\_scale: don’t know what it means exactly but from google guessing its just a variable that’s asking if the borehole is small enough to have been manually dug, so a variable to determine hole size?

Packer\_vs\_TAC: variable asking what type of tubing system there is, variables are OTHER\_ANCHOR which is probably TAC, OTHER\_PACKER which is probably packer, and arrowset which idk but probably means some combination of both?

Avg\_pressure\_flowline: average pressure of the flowline for the oil

Avg\_pressure\_tubing: average pressure of the tubing for the drill

Avg\_pressure\_casing: average pressure for the casing of the tube/drill

Avg\_differential\_pressure: literally avg\_pressure\_casing – avg\_pressure\_tubing

Avg\_oil\_volume: Sucker-rod strings transfer the motion from the driving machine on the wellhead to the downhole oil pump; not sure of the units

Avg\_water\_volume: Self-explanatory; not sure of the units

Avg\_liquid\_volume: literally the addition of avg\_oil\_volume + avg\_water\_volume

Avg\_watersg: Water specific gravity

**Rod\_sinker\_type:** Sinker bars provide concentrated weight above the pump to help keep the rod string straight and in tension, which reduces buckling of the sucker rods. This helps increase production and decreases the overall operating costs on the rod sucker pump

Rod\_has\_guides: Guides are basically plastic molded coverings for the sucker rod pumps so that they have protection from high temperatures and pressures downhole

Rod\_make: encoded manufacturer IDs

Rod\_apigrade: Industry requirements and specifications for different rods. 3 main classes for steel rods (C, K, D). C can handle tensile strengths of 90,000 to 115,000 psi. D has the same specifications but are made of nickel which helps against corrosion and are also more expensive, K can handle tensile strengths of 115,000 to 140,000 psi. There are also other classifications for non-steel which are labeled as Special Service.

Route: Not sure, could be flow divider?

Overall\_max\_sideload: Sideload is the force between the tubing and the sucker rod in lbs.

Shallow\_max\_sideload: Shallow side max sideload

Max\_unguided\_sideload: Usually the same as the overall\_max\_sideload but it is a measure of the sideload without guides

Dessanddegas\_typ: DES is drilling equipment set and degas probably means degasser. This variable is probably the manufacturer of the DES and degas system for a pump

Chrome\_length: NA; most values are zero. Could be the chromium alloy reference?

**Enduralloy\_length:** The feature of Enduralloy™ tubing is the diffusion alloying surface engineering process which creates a hard and dense alloy on the surface of the steel substrate. This engineered surface provides excellent protection against abrasion due to rod wear above the pump or around a deviation and corrosion in extreme environments where tubing failures regularly occur

Poly\_length: NA; most values are zero, maybe a reference to multiple alloys in drilling or tubing?

Nipple\_Set\_Depth: depth at which the nipple is set up downhole

Pump\_bore: A bore pump is either an above ground pump and motor that sucks water out of a bore or a submersible pump. This variable is probably the height of the bore pump above the hole?

Gasanchor\_od: the orifice diameter of the gas anchor