

LOS AUTOMATED ANALYSIS WORKFLOW

USER GUIDE

Demo Version | Centriv Petrologic Petroleum Engineering Consultants

For use by Investment Banking Energy Group analysts, Reservoir Engineers, FP&A, and asset managers

300 Wells 5-Year History	11 Excel Tabs 1 PDF + 2 Software Exports
7 Analysis Modules Aries & PHDWin Compatible	< 5 Minutes Full portfolio runtime

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1. What Is This Workflow?

The LOS Automated Analysis Workflow is a Python-based tool that reads well, lease, and field data from a database, runs a full suite of petroleum economics analyses, and produces ready-to-use Excel workbooks, PDF summaries, and economic software exports — all in a single command.

It was built for investment banking analysts and asset managers who review Lease Operating Statements (LOS) for upstream oil and gas assets. Instead of manually building pivot tables and cost breakdowns for hundreds of wells, the workflow does it automatically in under five minutes.

1.1 What Problem Does It Solve?

Without this tool, a typical LOS review requires:

- Manually downloading data from the accounting system (JIBs, revenue statements)
- Building Excel models for each lease or field
- Recalculating lifting costs, revenue variance, and economic limits by hand
- Copying and pasting results into PowerPoint for the investment committee

This workflow replaces all of that. You run one command, and you get a fully formatted Excel workbook, a four-page PDF executive summary, and export files ready for Aries or PHDWin.

1.2 Who Should Use This?

Role	Primary Use	Key Output	Time Saved
IB Analyst	Due diligence on acquisition targets	Excel Report + PDF	3-4 hours per deal
Asset Manager	Monthly portfolio monitoring	Strategy Matrix + Alerts	2 hours per month
Reservoir Engineer	Decline curve fitting + benchmarking	PHDWin / Aries exports	1-2 hours per asset
Finance / Accounting	LOE variance and cost audit	Revenue Variance tab	1 hour per period

2. Installation & Setup

2.1 System Requirements

Requirement	Minimum	Recommended
Python	3.10	3.12+
RAM	4 GB	8 GB (for 300+ wells)
Disk space	500 MB	1 GB
Operating System	Windows 10, macOS, Linux	Windows 11 / Ubuntu 22

2.2 Step-by-Step Installation

1. Download and extract the source package `LOS_Workflow_v2.0_Source.zip` to a folder of your choice, for example `C:\LOS_Workflow\`
2. Open a terminal (Command Prompt or PowerShell on Windows, Terminal on Mac/Linux) and navigate to that folder:

```
cd C:\LOS_Workflow
```

3. Install all required Python packages with one command:

```
pip install -r requirements.txt
```

4. Verify the installation completed successfully:

```
python -c "import pandas, xlswriter, reportlab, plotly; print('Installation OK')"
```

✓ **TIP:** If you see `Installation OK` printed, you are ready to run the pipeline. If you see an error, re-run the `pip install` command and check your internet connection.

2.3 Folder Structure After Installation

After extracting, your folder should look like this:

```
LOS_Workflow/
  01_generate_database.py    <- Creates the sample database
  02_los_analysis_engine.py  <- Runs all 7 analysis modules
  03_excel_report.py         <- Builds the Excel workbook
  10_run_pipeline_v2.py      <- Main entry point (start here)
  requirements.txt           <- Python package list
  config/
    config.yaml              <- All settings and thresholds
  dashboard/
    los_dashboard.py         <- Interactive web dashboard
  tests/
    test_los_workflow.py     <- Automated test suite
```

3. Running the Pipeline

3.1 Your First Run (5 Minutes)

To run the complete workflow from scratch including database generation, all analyses, and all reports, open your terminal and type:

```
python 10_run_pipeline_v2.py
```

That is all. The pipeline will:

5. Generate the 300-well sample database (about 45 seconds)
6. Validate the data quality (about 5 seconds)
7. Run all 7 analysis modules (about 15 seconds)
8. Run scenario and sensitivity analysis (about 10 seconds)
9. Build the 11-tab Excel workbook (about 20 seconds)
10. Generate the 4-page PDF executive summary (about 5 seconds)
11. Export Aries and PHDWin files (about 10 seconds)

When complete, you will see a summary like this:

```
Wells analysed           :      300
12M Net Revenue          :   $24,871,043
12M Total LOE            :   $12,456,832
12M Operating Income     :   $10,914,211
Avg Lifting Cost/BOE     :    $18.42
Critical wells (P&A/SI)  :        22
Healthy wells            :       145
Excel Report: output/LOS_Full_Report_v2.xlsx
```

3.2 Common Commands

Command	What It Does	When to Use	Approx. Time
python 10_run_pipeline_v2.py	Full pipeline from scratch	First run or monthly rebuild	~2 min
python 10_run_pipeline_v2.py -skip-db	Re-run analysis on existing DB	Same month, config change	~1 min
python 10_run_pipeline_v2.py -skip-db --from 2023-01 --to 2024-12	Analyse a specific date range	Period-specific due diligence	~45 sec
python 10_run_pipeline_v2.py -skip-db --preset permian_horizontal	Apply a play-type preset	Client asset in Permian	~1 min
python 10_run_pipeline_v2.py -skip-db --no-exports	Skip Aries/PHDWin files	Excel/PDF only	~45 sec
python 10_run_pipeline_v2.py -dashboard	Launch interactive dashboard	Exploration and drilling down	Instant
python 10_run_pipeline_v2.py -test	Run test suite first	Before a client delivery	~10 sec

3.3 Play-Type Presets

Different asset types have different economic norms. Presets automatically adjust the alert thresholds in config.yaml to match the play you are analysing. Use the --preset flag:

```
python 10_run_pipeline_v2.py --skip-db --preset haynesville_gas
```

Preset Name	Use For	Key Adjustments
permian_horizontal	Permian Basin horizontal oil wells	LOE alert: 55%, Lift cost alert: \$25/BOE
haynesville_gas	Haynesville / dry gas plays	LOE alert: 70%, Lift cost alert: \$1.50/Mcfe
waterflood_mature	Mature waterfloods, EOR assets	LOE alert: 80%, 12-month rolling window
offshore	Offshore platforms and subsea	LOE alert: 40%, Lift cost alert: \$20/BOE

 **NOTE:** You can also edit config/config.yaml directly to set your own custom thresholds. See Section 7 for details.

4. Understanding the Excel Report

The Excel workbook (LOS_Full_Report_v2.xlsx) has 11 colour-coded tabs. Each tab answers a specific business question. This section explains what each tab shows and how to read it.

4.1 Tab Overview

Tab	Colour	Business Question Answered	Primary Audience
01 – Executive Dashboard	Navy	How is the portfolio performing overall?	Management / IC
02 – Strategy Matrix	Gold	Which wells need immediate action?	Asset Manager
03 – LOE Breakdown	Orange	Where are costs going and who are the bad actors?	Engineer / Finance
04 – Revenue Variance	Green	Why did revenue change from last month?	Finance / Analyst
05 – Economic Screening	Red	Which wells are losing money?	Asset Manager
06 – Field Trends	Purple	How is each field trending over time?	Engineer / Analyst
07 – Downtime Impact	Red	How much revenue did we lose to downtime?	Operations / Engineer
08 – Raw Data (BI Export)	Grey	Full dataset for Power BI or Spotfire	Analytics / IT
09 – Scenario Analysis	Purple	What happens to portfolio value if oil drops?	Analyst / IC
10 – Workover ROI	Red	Did our workovers actually improve production?	Engineer / Manager
11 – Breakeven Analysis	Green	At what oil price does each well become uneconomic?	All

4.2 Tab 02: Strategy Matrix – Your Most Important Tab

The Strategy Matrix ranks every well from most urgent to healthiest. It is the first tab to check each month. Each well has a colour-coded action:

●	P&A / Divestment	6+ consecutive months of negative operating income. This well is destroying value. Initiate plug and abandon evaluation or asset divestment process immediately.
●	Shut-In Candidate	3+ consecutive months of negative operating income. Cash flow negative on a sustained basis. Evaluate shut-in economics versus continued operating costs.
●	Workover Optimisation	Workover costs exceed 30% of total LOE. The well has mechanical instability. Review completion design and artificial lift method.
●	Water Handling	Water disposal costs exceed 25% of total LOE or 50% of oil revenue. Evaluate SWD optimisation or artificial lift modification.
●	Above Basin P75	Lifting cost is in the top quartile for this basin. The well is not a crisis but deserves a cost reduction review.

	Monitor	No specific flag triggered. Routine monitoring. Check again next month.
	Healthy / Infill	Consistently profitable with stable or declining unit costs. Consider as infill drilling or secondary recovery candidate.

 **TIP:** Use the AutoFilter in Row 3 to filter by Priority column. Filter to 1 and 2 to see only critical wells. This is the fastest way to build the daily action list.

4.3 Tab 04: Revenue Variance – Reading the Decomposition

The Revenue Variance tab splits every month-over-month revenue change into two components:

Component	What It Means and What Action to Take
Price Effect	Revenue change caused purely by commodity price movement. This is market-driven and outside your control. A large negative Price Effect with a stable Volume Effect means the market moved against you — no operational action needed.
Volume Effect	Revenue change caused by a change in production volumes. This IS operational. A large negative Volume Effect means production declined faster than expected. Escalate to field operations to investigate mechanical, reservoir, or surface facility issues.
NRI Leakage Flag	Appears as a warning when the actual net-to-gross revenue ratio deviates more than 5% from the declared Net Revenue Interest in the division order. Investigate with the revenue accountant — this often indicates a mis-coded decimal in the ownership system.

4.4 Tab 09: Scenario Analysis – Stress Testing the Portfolio

The Scenario Analysis tab applies four commodity price cases to current production volumes. It answers the investment committee question: what is our portfolio worth if oil prices fall?

Scenario	Oil Price	Interpretation
Base Case	\$70/BBL	Current forward curve. Used for budget planning.
Low Case	\$50/BBL	Moderate price downturn. Stress test for hedging decisions.
High Case	\$90/BBL	Bullish scenario. Used for upside valuation in deals.
Stress Case	\$35/BBL	Severe downturn (COVID-level). Used for downside risk assessment and bank covenant testing.

The NPV column shows PV10 — the portfolio value discounted at 10% per year over a 10-year production forecast. This is the standard industry metric for asset valuation.

4.5 Tab 10: Workover ROI – Was the Money Well Spent?

Every workover event is classified into one of four categories based on the pre- and post-workover production rate:

Classification	Production Change	What to Do
VALUE ADD – HIGH	Rate improved >20%	Good investment. Document and apply learnings to similar wells.
VALUE ADD – MODERATE	Rate improved 10-20%	Acceptable return. Monitor for re-stimulation opportunity.
VALUE ADD – LOW	Rate improved <10%	Marginal. Evaluate whether the payout period is acceptable.
MAINTENANCE	Rate unchanged	Necessary cost to keep the well producing. Acceptable.
MAINTENANCE SINK	Rate declined after workover	Red flag. Review workover design. Was the right job done on the right well?

 **NOTE:** The Payout column shows how many months of incremental revenue are needed to recover the workover cost. A payout of less than 12 months is generally considered a good workover.

4.6 Tab 11: Breakeven Analysis – The Safety Margin

The Breakeven Oil Price is the oil price at which a well's operating income equals zero — the floor below which the well destroys value. The Price Headroom is the buffer between today's price and that floor.

Breakeven Flag	Interpretation
BELOW BREAKEVEN	The well is already losing money at current prices. See Tab 05 for the economic limit action recommendation.
< \$10 Headroom	The well is barely economic. A \$10 price drop would render it uneconomic. Consider hedging or cost reduction.
ECONOMIC	The well has a comfortable margin above its breakeven price.

5. The Interactive Dashboard

The dashboard is a browser-based tool for exploring the data interactively. Unlike the Excel report which is a static snapshot, the dashboard lets you filter, zoom in on individual wells, and model custom price scenarios with live sliders.

5.1 Launching the Dashboard

To start the dashboard, run:

```
python 10_run_pipeline_v2.py --dashboard
```

Then open your browser and go to:

```
http://localhost:8501
```

 **NOTE:** The dashboard reads directly from the database. Make sure the database has been generated first (run the pipeline at least once without `--dashboard`).

5.2 Dashboard Pages

Page	What You Can Do	Key Visuals
Portfolio Overview	See the whole portfolio at a glance. Filter by basin, field, or status.	Well location map, revenue vs LOE trend, economic status donut chart
Well Drilldown	Select any individual well and see its full production history, LOE breakdown, and pressure data.	Daily fluid rates, operating income waterfall, LOE treemap
Scenario Analysis	Move the oil and gas price sliders and instantly see how portfolio NPV and well economics change.	Live NPV calculation, well-level scatter plot coloured by status
LOE Deep Dive	See how costs are distributed across categories and identify the highest-cost wells.	LOE treemap, stacked area trend, top-10 bar chart
Economic Screening	Visualise the distribution of rolling operating income and compare breakeven prices to realised prices.	Histogram, breakeven vs realised price chart, bottom-20 wells table
Workover ROI	Browse all workover events sorted by cost and type.	Cost by type bar chart, monthly spend timeline, event detail table

5.3 Using the Sidebar Filters

The left sidebar has four filters that apply to every page simultaneously:

- **Basin** – Filter to a single basin such as Permian Midland or Eagle Ford
- **Field** – Narrow down to one field within the selected basin
- **Status** – Filter to Active, Shut-In, or P&A wells only
- **Period** – Use the date range picker to focus on a specific time window

 **TIP:** To reset all filters back to the full portfolio, set Basin, Field, and Status back to All and the period to the full date range.

6. Aries and PHDWin Exports

The workflow generates export files compatible with both Aries (Halliburton) and PHDWin (TRC Consultants) economic software platforms. These files let engineers import all 300 wells directly into their economic models without re-entering data by hand.

6.1 Aries Export Files

The Aries export package (LOS_Aries_Export.zip) contains nine files:

File	Aries Section	Contents	Import Into
aries_master.dat	All sections combined	Single file containing all sections below. Use this for a complete import.	Aries Data Manager
aries_property.txt	PROPERTY	Well name, API number, field, state, county, operator for each well.	Property Setup
aries_wellid.txt	WELLID	API number cross-reference table linking property IDs to API numbers.	Well ID Setup
aries_ac_economics.txt	AC_ECONOMICS	Decline parameters (OIL, GAS, WATER keywords), prices, LOE as OPX, severance tax, WI, NRI for each well.	Economic Input
aries_production.txt	PDEN	Monthly production history (oil, gas, NGL, water) in YYYY/MM format.	Production Data
aries_prices_base.txt	PRICES	Base case price deck (\$70 oil, \$2.75 gas). Override in Aries as needed.	Price Deck Setup
aries_prices_low.txt	PRICES	Low case price deck (\$50 oil).	Price Deck Setup
aries_prices_high.txt	PRICES	High case price deck (\$90 oil).	Price Deck Setup
aries_prices_stress.txt	PRICES	Stress case price deck (\$35 oil).	Price Deck Setup

How to Import into Aries

12. Open Aries Data Manager
13. Go to File > Import > Flat File
14. Select aries_master.dat (or individual section files)
15. Map the qualifier to your project name
16. Click Import and verify the well count matches (300 wells)

⚠ The AC_ECONOMICS section uses the qualifier name defined in config.yaml (default: LOS). If you change the qualifier in Aries, update config.yaml before regenerating exports.

6.2 PHDWin Export Files

The PHDWin export package (LOS_PHDWin_Export.zip) contains five tab-delimited files:

File	PHDWin Import Template	Contents
phdwin_well_header.txt	Well Header Import	27 columns including PropertyID, API number, operator, location coordinates, TVD, formation, lift method, WI, NRI, royalty, spud date, and first production date.
phdwin_prod_history.txt	Prod History Import	Monthly production volumes (oil, gas, NGL, water) with days produced and days of downtime per month per well.
phdwin_economics.txt	Economics Worksheet	12 LOE cost categories, oil and gas prices, severance and ad valorem tax percentages, royalty, net revenue, and operating income by well-month.
phdwin_decline_params.txt	Decline Curve Analysis	Fitted Arps hyperbolic decline parameters (initial rate, Di, b-factor) for oil and gas separately for each well. Ready to import into the DCA module.
phdwin_price_decks.txt	Price Deck Setup	All four price scenarios (Base, Low, High, Stress) for import into the price deck library.

How to Import into PHDWin

17. Open PHDWin and create or open your project
18. Go to File > Import > Tab Delimited Text
19. Select phdwin_well_header.txt first — this creates all wells in the project
20. Then import phdwin_prod_history.txt — this fills in the production history
21. Then import phdwin_economics.txt — this populates the economics worksheet
22. Finally, import phdwin_decline_params.txt into the Decline Curve Analysis module

 **TIP:** Always import the well header file first. PHDWin requires wells to exist before production history can be linked to them.

7. Configuring the Workflow

All settings are controlled by one file: config/config.yaml. You do not need to touch any Python code to change how the workflow behaves. Open config.yaml in any text editor (Notepad works fine).

7.1 Key Settings to Know

Analysis Period

```
analysis:
  period_from: "2020-01"      # Start of analysis window
  period_to:   "2024-12"      # End of analysis window
  rolling_months: 6           # Months used for rolling averages
  mcf_to_boe: 6.0             # Gas conversion factor
```

 **NOTE:** For high-BTU gas plays (liquids-rich), change mcf_to_boe to 5.5 or lower. For lean gas, keep it at 6.0.

Economic Thresholds

```
thresholds:
  loe_pct_revenue_alert: 60.0 # Flag wells where LOE > 60% of revenue
  lifting_cost_alert_boe: 30.0 # Flag wells where lift cost > $30/BOE
  workover_bad_actor_pct: 0.30 # Flag when workover > 30% of total LOE
  water_bad_actor_pct:    0.25 # Flag when water disposal > 25% of LOE
  consecutive_neg_shutin: 3     # Months before shut-in recommendation
  consecutive_neg_pa:      6     # Months before P&A recommendation
```

 **Changing these thresholds changes how many wells are flagged as critical. Always document what thresholds you used in your deliverable so reviewers can reproduce your findings.**

Commodity Price Scenarios

```
price_scenarios:
  base:                                # You can rename and adjust any scenario
    oil_price: 70.0
    gas_price: 2.75
    ngl_price: 28.0
    label: "Base Case"
  stress:
    oil_price: 35.0                    # Change to match the bank stress test
    gas_price: 1.50
    ngl_price: 14.0
    label: "Stress Case ($35 oil)"
```

Email Alerts

```
alerts:
  enabled: false                      # Change to true to enable email
  smtp_server: "smtp.office365.com"
  sender: "los-alerts@yourfirm.com"
  recipients:
    - "analyst@yourfirm.com"
    - "manager@yourfirm.com"
```

 **NOTE:** Email credentials (username and password) are read from environment variables `LOS_EMAIL_USER` and `LOS_EMAIL_PASS` — never put passwords in `config.yaml`.

7.2 Using Your Own Database

To connect the workflow to your real database instead of the sample database, edit `config.yaml`:

```
database:
  path: "C:/ClientData/production.db" # Path to your SQLite database
  type: "sqlite"
```

For a Microsoft Access database, update the connection in `los_analysis_engine.py` (see the technical documentation for connection string examples). The table names (`tbl_Wells`, `tbl_MonthlyLOS`, etc.) must match the schema defined in the database schema section of the documentation.

8. Data Validation

Before running analysis, the pipeline automatically checks the database for data quality problems. You can also run validation separately at any time:

```
python 05_validate_database.py
```

8.1 Validation Checks

The validator runs 22 checks grouped into categories:

Check Category	What Is Checked	Status If Problem Found
Table existence	All required tables are present in the database	FAIL – pipeline will stop
Row counts	Wells, LOS records, and daily production records exist	FAIL – pipeline will stop
Referential integrity	Every well links to a valid lease; every LOS record links to a valid well	FAIL – analysis will be wrong
Production values	No negative oil or gas production; downtime between 0 and 24 hours	FAIL – unit costs will be wrong
Interest decimals	WI + Royalty does not exceed 100%; NRI does not exceed WI	FAIL – revenue calculations will be wrong
Revenue logic	Net revenue does not exceed gross revenue	FAIL – NRI may be mis-coded
Duplicates	No duplicate well-month combinations in the LOS table	FAIL – costs will be double-counted
Price deck	At least 12 months of commodity prices exist	WARN – scenario analysis may be incomplete
Outliers	Lifting cost above \$500/BOE on material wells	WARN – investigate data entry error

8.2 Reading the Validation Report

The validation report prints to your terminal and looks like this:

```

DATABASE VALIDATION REPORT
=====
[✓] PASS Required tables present          All required tables found
[✓] PASS Row count - tbl_Wells            300 rows
[X] FAIL WI + Royalty > 1.0               31 records
[⚠] WARN Extreme lifting cost outliers    5 well-months
=====
Result: 1 FAIL | 1 WARN | 20 PASS

```

Any FAIL means a critical data problem exists that will produce wrong results. Fix the source data before proceeding. A WARN means something unusual was found but the pipeline can still run.

⚠ Never present results from a pipeline run with a FAIL validation status to a client. Investigate and fix the data issue first.

9. Power BI and Spotfire Integration

Tab 08 of the Excel report (Raw Data BI Export) contains a flat denormalised table of all well-month records ready for direct import. Alternatively, connect directly to the SQLite database for live refreshes.

9.1 Power BI Connection

23. Open Power BI Desktop
24. Click Get Data, then select ODBC
25. If you do not have the SQLite ODBC driver installed, download it from sqliteodbc.sourceforge.net and install it first
26. In the ODBC connection dialog, enter the database path as the DSN or connection string
27. Load these four tables and create relationships on WellID, LeaseID, and FieldID:
 - tbl_MonthlyLOS
 - tbl_Wells
 - tbl_Leases
 - tbl_Fields

Useful Power BI Measures

```
// Lifting Cost per BOE
Lifting Cost BOE = DIVIDE(SUM(tbl_MonthlyLOS[TotalLOE]),
SUM(tbl_MonthlyLOS[NetBOE]))
```

```
// LOE as % of Net Revenue
LOE Pct Revenue = DIVIDE(SUM(tbl_MonthlyLOS[TotalLOE]),
SUM(tbl_MonthlyLOS[NetTotalRevenue])) * 100
```

```
// Wells Below Economic Limit
Critical Wells = CALCULATE(COUNTROWS(tbl_MonthlyLOS),
tbl_MonthlyLOS[OperatingIncome] <= 0)
```

9.2 Spotfire Connection

28. Open Spotfire and go to File > Add Data Table > Database
29. Use a JDBC connection with the SQLite JDBC driver
30. Set the JDBC URL to: jdbc:sqlite:path/to/los_database.db
31. Load tbl_MonthlyLOS joined to tbl_Wells, tbl_Leases, and tbl_Fields
32. Use YearMonth as the time axis for trend visualisations
33. Use Basin and FieldName as filter dimensions in your filter panel

10. Troubleshooting

10.1 Common Errors and Fixes

Error Message	Cause	Fix	Where to Check
Database not found at data/los_database.db	Database has not been generated yet	Run the pipeline without --skip-db to generate the database first	Terminal / command prompt
ModuleNotFoundError: No module named pandas	Python packages not installed	Run: pip install -r requirements.txt	Terminal
NAN/INF not supported in write_number()	A calculation produced a divide-by-zero	This is handled automatically in v2.0. If it persists, check for wells with zero production and zero LOE in the same month.	Excel report log
Validation FAIL: WI + Royalty > 1.0	Ownership deck has incorrect decimals	Review the working interest and royalty columns in tbl_Leases. Common cause: WI entered as percentage (75) instead of decimal (0.75)	Database / source data
Teams alert failed: connection timeout	Webhook URL is incorrect or Teams channel is restricted	Verify the webhook URL in config.yaml. Re-create the webhook in Teams if necessary.	config/config.yaml
Excel file opens with Repair warning	Previous Excel run was interrupted mid-write	Delete the partial Excel file and re-run the pipeline	output/ folder

10.2 Getting Help

If you encounter an issue not listed above:

34. Check the log file in the logs/ folder — it contains detailed error messages with line numbers
35. Run the test suite to verify the core calculations are working: `python 10_run_pipeline_v2.py --test`
36. Check that your config.yaml file is valid YAML (no tabs, correct indentation) using an online YAML validator
37. Contact the Analytics Group with the full log file attached

11. Glossary

Key terms used throughout this guide and the Excel report:

Term	Definition
LOE	Lease Operating Expense. All costs required to operate a producing well, including labor, chemicals, water disposal, compression, and workovers.
LOS	Lease Operating Statement. The monthly financial summary for a well or lease showing revenue, costs, and operating income.
BOE	Barrel of Oil Equivalent. A unit that converts all hydrocarbon streams to a common base using the conversion: 1 BOE = 1 barrel of oil = 6 Mcf of gas.
WI	Working Interest. The ownership percentage that is responsible for paying the operating costs and capital expenditures.
NRI	Net Revenue Interest. The ownership percentage entitled to receive revenue from production after royalties. Always less than WI.
Lifting Cost / BOE	The total LOE divided by net BOE produced. The core unit cost metric. Used to compare wells and benchmark against peers.
Economic Limit	The production rate (or time) at which a well's operating income equals zero. Below this point, the well destroys value.
PV10	Present Value at a 10% annual discount rate. The standard industry metric for upstream asset valuation.
Severance Tax	A state-level production tax levied on oil and gas extracted in that state. Typically 4-8% of gross revenue in Texas.
GOR	Gas-Oil Ratio. The volume of gas produced per barrel of oil, measured in Mcf/BBL.
WOR	Water-Oil Ratio. The volume of water produced per barrel of oil. A rising WOR indicates increasing water cut and higher disposal costs.
Arps Decline	The industry-standard mathematical model for production decline forecasting, using initial rate (q_i), decline rate (D_i), and hyperbolic exponent (b).
Workover	A well intervention operation to restore or improve production. Examples include pump replacements, perforations, and sand control.
P&A	Plug and Abandon. The process of permanently decommissioning a well by setting cement plugs in the wellbore.
HBP	Held By Production. A lease that remains in force because the property is actively producing, even after the primary term has expired.
JIB	Joint Interest Billing. The invoice sent by the operating company to non-operating working interest owners for their share of operating costs.

End of User Guide – LOS Automated Analysis Workflow Demo Version