
# Alpha XP Regulations

Public session

# General

**PetroCup XP Sessions** are based around the fields which are in production for many years and falling behind the production schedule due to typical well and reservoir complications.

The new FDP suggest 3 different packet activities (called "Shots"), one Shot every 1 year.

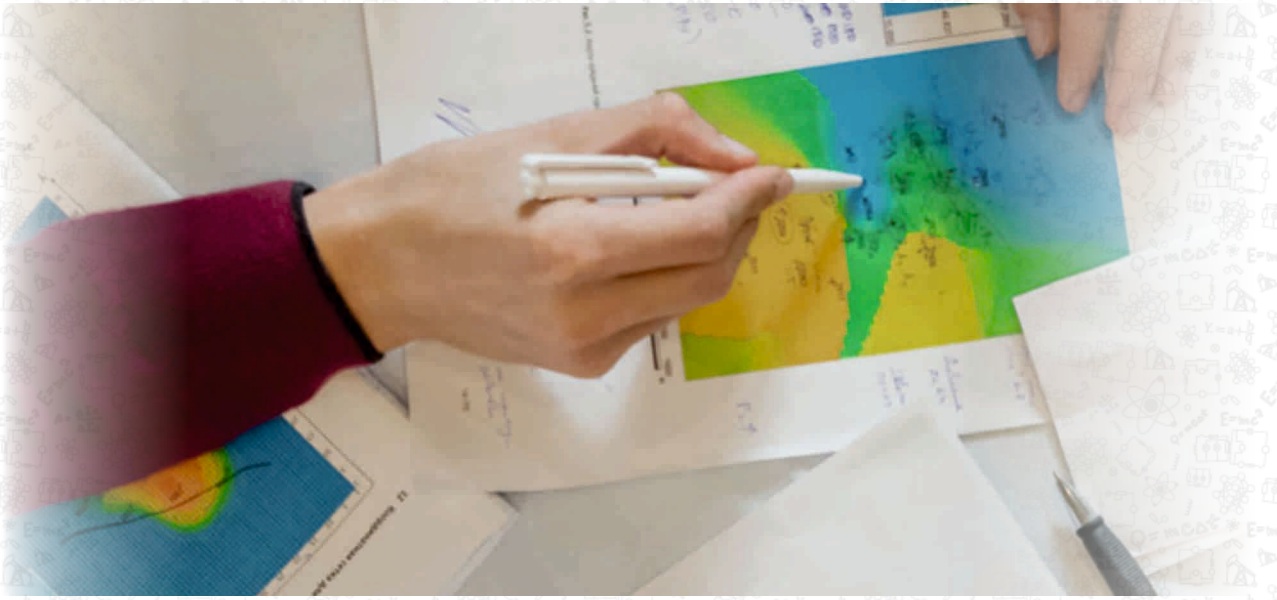
The **Asset Teams** are challenged to analyse the available data and implement FDP to maximise the EBITDA in the next 3 years.

**PetroCup Sessions** are running on-line via web-interface where teams can find primary data on the field and its production, implement new redevelopment activities and monitor field response.

**PetroCup XP Sessions** are supported by **PetroCup Moderator**.

The **Asset Team Leader** (also called "**Captain**") will receive login and password by e-mail in at least one day before **PetroCup Session** to get on-line access to **PetroCup Session** page and takes full responsibility for interaction with **PetroCup Server** and **PetroCup Moderator**.

The anonymity of the teams is guaranteed. Asset Team Leader has the right to name the team himself.



# Field Complications

**PetroCup** field data is highly realistic, based on the real fields and generated by **PetroCup Server** software which realistically simulates:

| | | |
|---|---|---|
| 1 | Typical reservoir inhomogeneity | Multi-layer formations<br>Multifacies formation<br>Different depositional patterns<br>Pinch outs<br>Natural Faults and Fractures |
| 2 | Typical uncertainties in surface flow metering | Poor reallocation of production and injection for commingled wells and selective metering at surface<br>Gas rate measurements mistakes<br>Poor split between lift gas and production gas |
| 3 | Typical OH and PLT logging tool inaccuracy | GR, CNL, IDL, T, P, FBS, FlowDens, FlowCap, FlowRes, PNN/PNG |
| 4 | Well integrity failures | Pump failure of age<br>Tubing/Casing failure under high delta pressure and thief production/injection<br>Cement bond failure under high delta pressure and thief production/injection |
| 5 | Reservoir flow complications | Near reservoir-zone clogging and stimulation<br>Water Coning<br>Gas cap expansion<br>Fault / Fracture flow<br>Fixed and dynamic hydraulic fractures, including auto-induced fracture |

# Teams

Although there is no limitation to the team headcount it is recommended to include at least 7 people with following specialties:

| # | Position | Responsibility |
|---|---|---|
| 1 | Asset Manager | Decision making process management |
| 2 | Reservoir Engineer | Redevelopment planning and production targets |
| 3 | Simulation Engineer | Current reserves structure analysis |
| 4 | Geologist | Initial reserves structure analysis |
| 5 | Petrophysisist | Core and Open Hole data log analysis |
| 6 | Well & Log Analyst | Production Log analysis |
| 7 | Well Test Engineer | Production History and WellTests data analysis |

The team members can contribute on-line or face-to-face.

# Session Structure

**PetroCup XP3 Session** runs for one working day.

For those who are new to **PetroCup** world it is highly recommended to read the **Introduction** to **PetroCup** by watching the teaser and reading brochure in fair advance.

After that one need to read **Regulations** which are specific to the current **PetroCup Session** and require attention even for those who played **PetroCup** before.

This can be also done on-line and that's how you are probably reading this now.

Once teams are gathered on-line or in the room for **PetroCup Session** the **PetroCup Moderator** usually takes one hour to recap on specifics of the upcoming **Session** and ensure that teams can place shots and see the feedback from **PetroCup Server**.

# Public Session

The **Tournament** consists of 3 batches of production optimisation activities (called "**Shots**") which run every 1 year.

The teams are challenged to maximize EBITDA for the next 3 years.

The **Tournament Standings** will be updated after each **Shot** and will be available for all teams on-line.

The public table provides only full-field performance for each team and current position in the **Tournament**.

The **Shot** details and well-by-well response during the **Tournament** are confidential and only available for each team separately.

These details will be revealed to all teams later after the **Tournament** at **Debriefing** stage.

The **Tournament** starts with studying the **Field Review**.

Normally, the **Asset Team Leader** gives opportunity for team members to present their views on the field history, its peculiarities and probably start suggesting their opinion on the development strategy.

After that the team starts discussing the first **Shot** and the **Asset Team Leader** decides what exactly to place in the system.

Each **Shot** has a fixed time-out which is mentioned in **Session Schedule**.

The regulations are strict on timing and if the **Shot** is not committed in time the field will continue producing as NFA till the next **Shot**.

After placing a **Shot** the **PetroCup Server** will take approximately 15 min to process the data and revert back with field response.

## Shot Structure

Once all the activities of the next **Shot** are designed the **Asset Team Leader** should commit the **Shot** on-line and put the field on production for the next 1 year.
The **Shots** are performed: once a year on Jan 1.

Although the PetroCup web-facility is quite intuitive and user friendly it is recommended to go through **PetroCup XP User Guide** available on-line to understand how to place **Shots** correctly.

Each Shot can consists of the following field activities:

– Drilling New Wells
– Workovers
– Adding Perforations
– Production targets
– Formation Pressure Tests.

The budget for one shot is constrained, you can choose activities within a given amount.

Workovers (Selective Water Shut Off, Selective Stimulation, Conversion, Perforation) can not be doing without ноist operation.

## Drilling New Wells

Drilling new well is one month rig-based operation, all drillings are assumed 100% successful in operational terms, only vertical wells are allowed.

Drilling a new well consists of two steps: **Step 1** and **Step 2**.

**Step 1**

Defining the new well coordinates using the **Field Gridline** available in **Field Review** (Maps & Cross-sections chapter).

Once the coordinates are transferred to **PetroCup Server** it will take few minutes for the system to revert with the OH data logs on the newly drilled well.

This step should be completed at least 10 min before the **Shot** time-out so that a team has enough time to assess the results of the drilling and complete the **Shot** before time-out.

If team prefers taking longer time to discuss it needs to place the new wells coordinates earlier.

**Step 2**

Once the OH data logs on the new well received team should decide on perforation intervals and whether to put well in production or injection and at what flow rate.

This will join the inputs from other activities of the next **Shot**.

# Workover

The workover is a hoist-based operation which will cut production for 7 days.
All workovers are assumed 100% successful in operational terms.

The workover can be one of the three followings types:

| Workover Activity | Well category | Description |
|---|---|---|
| Remedial | Producer or Injector | May include:<br>— selective water shut-off by squeezing cement<br>— selective stimulation by acidization |
| Reactivation | Producer or Injector | May include any of remedial activities<br>May include conversion* |
| Conversion | Producer → Injector<br>Injector → Producer | May include any of remedial activities |

* the reactivation and conversion can be mingled in one workover operation

The intervals of selective treatment can be only set by formation units and can not be customised.

# Perforations

Perforations is a wireline operation which will cut production for 1 day.

All perforations are assumed 100% successful in operational terms.

The perforation intervals can be only set by formation units and can not be customised.

Reperforating the existing interval may result in production increase if the previous perforations were partially plugged but may also lead to cement failure which can reach water-bearing formations.

Team should be taking great care in reperforations close to water contact.

The allowance on Adding Perforations does not include drilling as it comes as a part of the drilling package.

# Production Targets

Injection targets are set by choking down the surface flow line at well head according to user-defined liquid rate. Production targets are set by lift or pump settings according to user-defined liquid rate.

Team can vary liquid rates for all wells at each **Shot**.

Teams should take a great care in manipulating the liquid rates as this may cause more pain than gain.

The field response depends on many factors:

- Reservoir factors
  - High drawdown in producers may cause water coning
  - High drawdown in producers may cause cement failure and behind-casing cross-flow resulting in high water cut from thief water production
  - High delta pressure in injectors may cause spontaneous hydraulic fracturing resulting in missing injection volumes and fast water transfer along the fracture
  - High delta pressure in injectors may cause cement failure and behind-casing cross-flow resulting in missing injection volumes
- Technical factors
  - Production rate is limited by
    - minimal bottom hole pressure
    - maximum production rate
    - maximum GOR
  - Injection rate is limited by
    - maximum pressure the wellhead can sustain
    - maximum total injection rate of the field pump station
- Economical factors
  - Producers will not be operated below critical oil production rate
  - Producers will not be operated above critical water cut

The Technical and economical limitations are specified in **Session Specifics Regulation**.

The field response is fully automated and may result in:

- different flow rates from what was requested by the team
- creating new complications in field perfomance which did not exist before.

## Formation Pressure Tests

Formation Pressure Testing is wireline operation with user-defined shut-in time which will be cut from production.

The duration of survey will be cut from production of the tested wells so the team should be aware of the consequences of the long-term survey.

On the other hand the overly short surveys may not end up with fair formation pressure assessment and may mislead the team on the energy capacity around tested well.

## Qualification

Recipe for success is determined by the session specification. Depending on the type of session - public or corporate, the victory criteria are determined by the Nafta College moderator or by client company.

Victory criteria:
1. Maximum EBITDA per tournament
2. Oil production per tournament
3. Maximum recovery factor at the end of development
4. Maximum EBITDA at the end of the development, subject to the achievement of the project recovery factor

## Debriefing

**PetroCup Server** is automatically filling the **Shot Performance Report** which will help teams understand the efficiency of their activities at **Debriefing** stage. **Moderator** is studying the above reports during the **Tournament** and will guide teams on their performance during **Debriefing** stage.

**Moderator** starts debriefing on the results of the previous **Sessions**:

**OMR** (Open Map Review) - is video presentation which lists all field complications and their diagnostics for the pre-Tournament production period.

**CAS** (Consolidated Activity Statistics) - is the summary web-table of a given session activities consolidated by activity type (in rows) and by team (in columns) which is generated automatically by **PetroCup** server during the session.

**AAA** (Activity-by-Activity Analysis) - is switched on then **PetroCup** server will finish processing all activities in a given shot and then will start repeating each and every activity individually to see a field response to each activity. Although the net response to all activities is not a simple sum of individual responses but still activity-by-activity analyses is helpful to assess its maximum potential. The difference between net response and sum of individual activities also reflects the interference between activities and qualifies the FDP efficiency.

For a **Public Session** at **Debriefing** stage, only the **CAS** (Consolidated Activity Statistics) is available.

# More Readings

One can read more on PetroCup web-facility in **PetroCup XP User Guide**.