



Introduction to Hydrocarbon Management and allocation

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2014-06-06

Hydrocarbon Management

- Hydrocarbon Management is about handling the hydrocarbon accounts and all the business related reporting in accordance with governmental requirements and contractual agreements *to protect and assure the owners share of production from the field(s).*
- The hydrocarbon Management shall ensure that all data and information used in all types of official reports is uniform and from a single verified source with a high level of quality and integrity in a way that prevents possible *financial and reputational risks.*

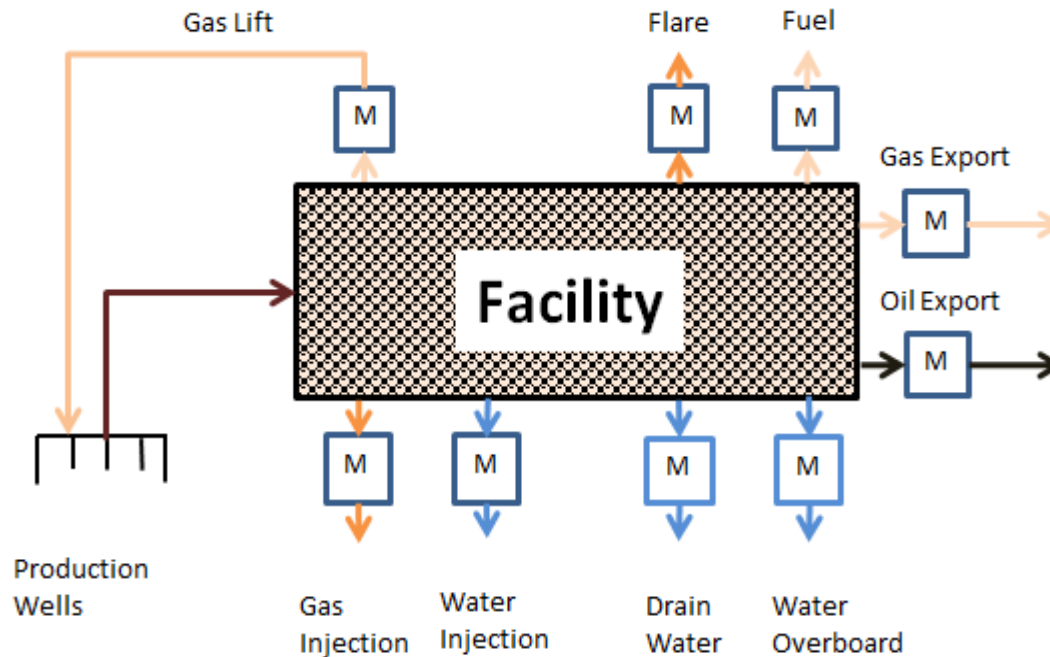
Mass balance

- Mass balance of the fluids at the facility.



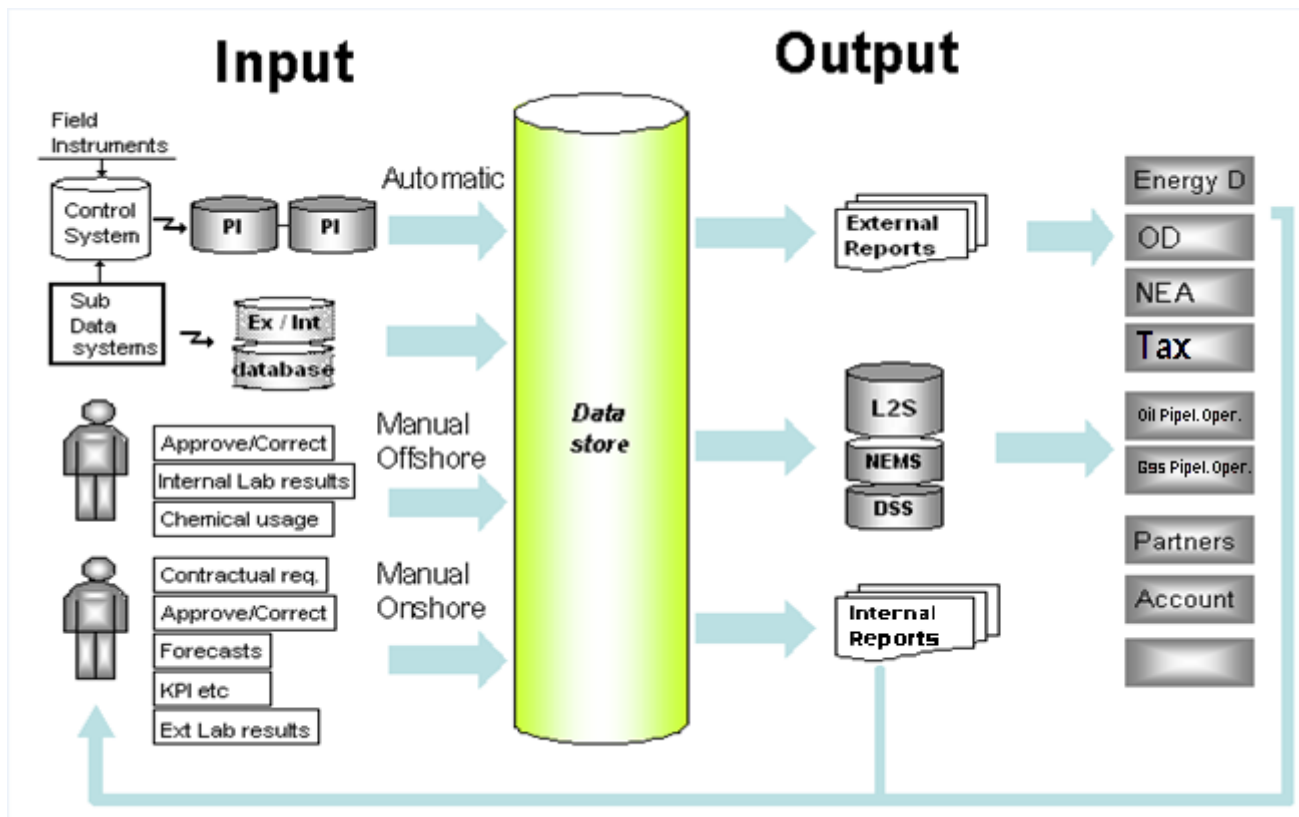
Mass balance

- Define all in-, out streams.
- Sufficient measurement of the in- and out streams.
- Define all figurative derived/ calculated streams needed for allocation and reporting.

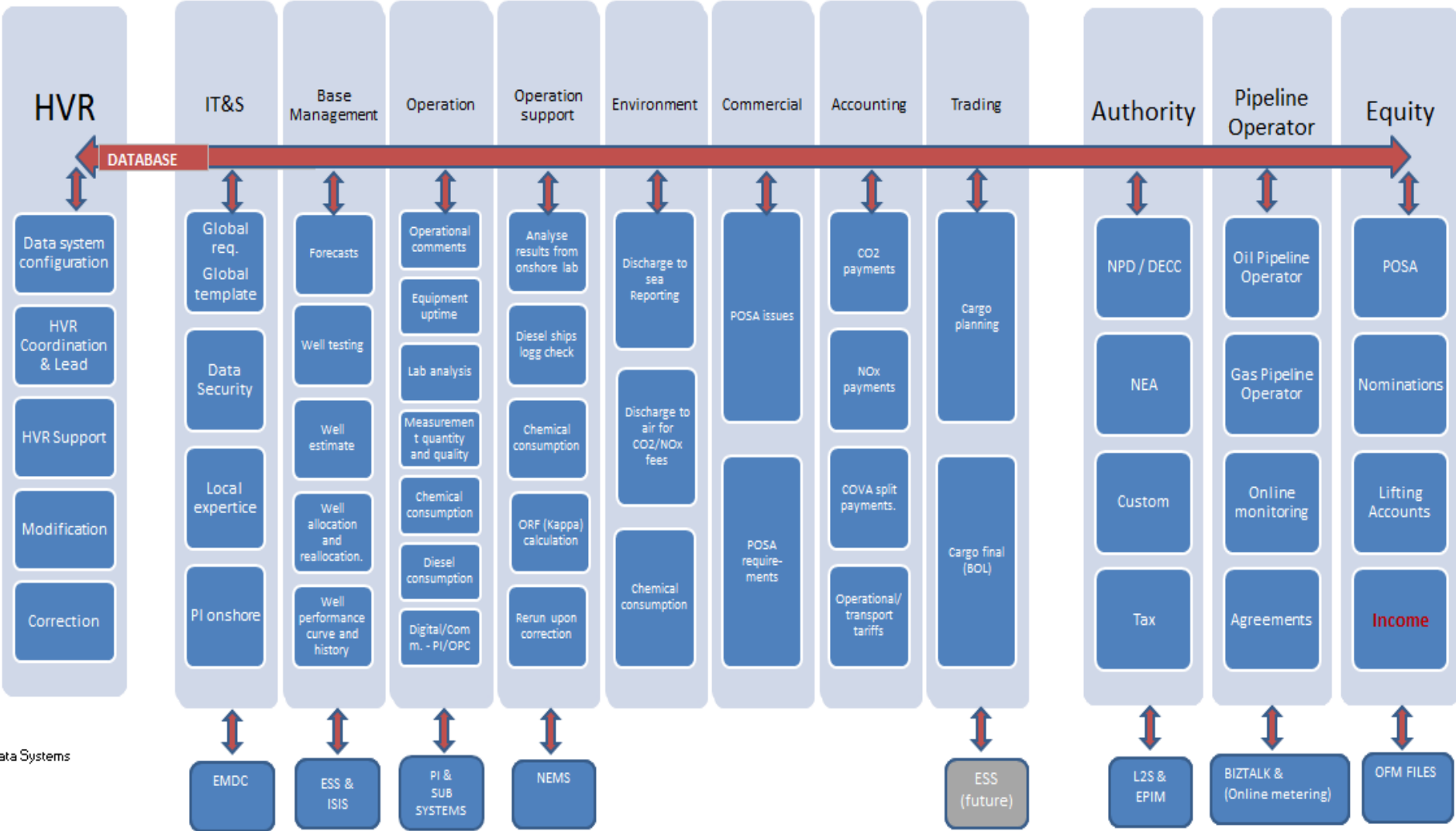


Computer based report system

- A system to monitor, record, verify, approve, calculate and report the flow of hydrocarbons in accordance with authority regulation and contractual agreements with Partners, pipeline operators and Tie-in fields.



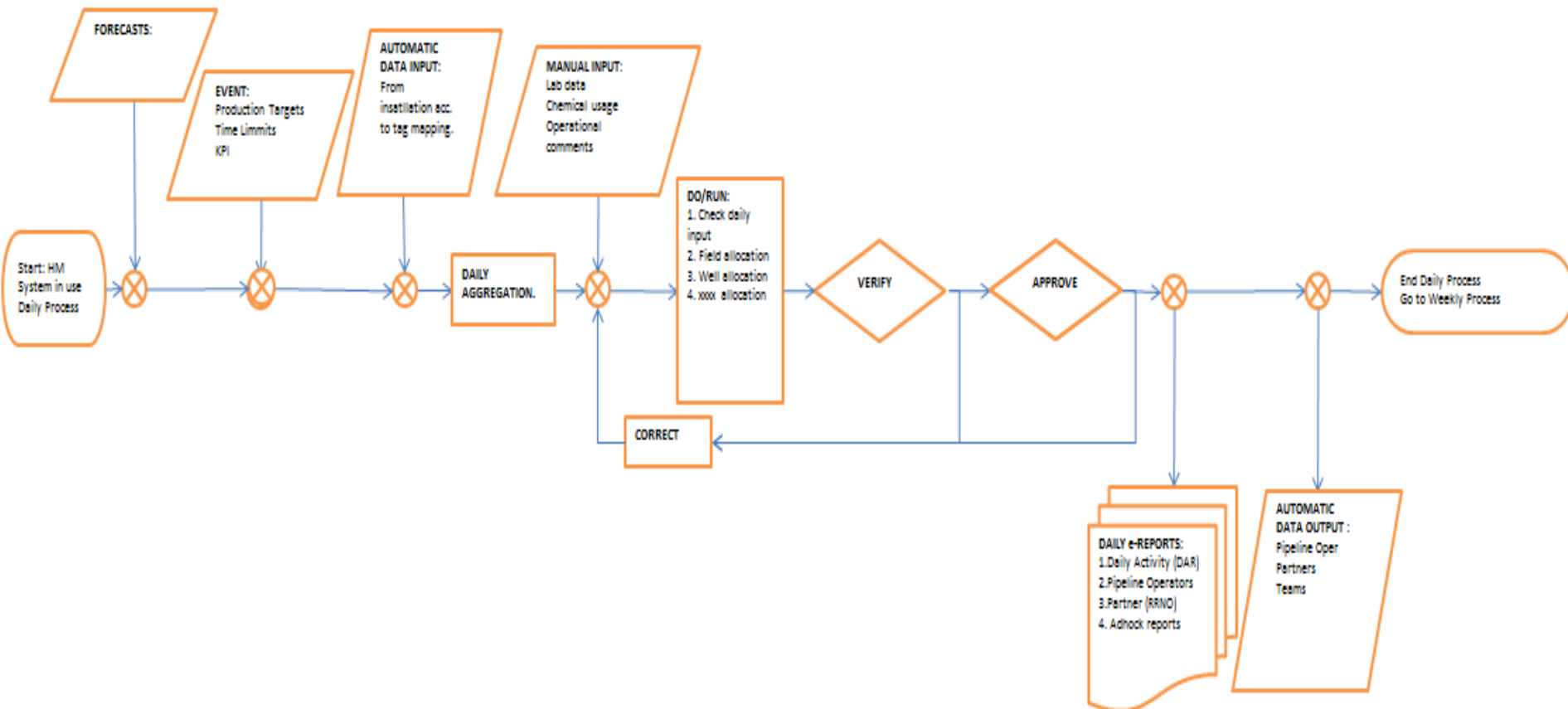
Integration



Data Systems

Hydrocarbon Management processes

- Describe processes



Allocation

The word «allocation» is used in relation to divide, share, split or distribute.

- Well allocation
- Field allocation
- Pipeline allocation

Allocation

- Well allocation:
 - Proportional dividing of the production/sale back to each individual production well.
- Field allocation:
 - Proportional dividing of the comingled export/sales back to each individual field/ license/equity share.
- Pipeline allocation:
 - Proportional dividing of the pipeline output between the shippers for lifting and sale.

Tie-in fields and field allocation

- With tie-in of a new field to an existing facility the field allocation can be done in different ways:
 - pro rata
 - by difference
 - well production

Pro rata allocation

- Measurement of all in and out streams, both for the tie-in and existing facility.
- Pro rata correlation of all in streams to match the out stream.
- Distribution of low uncertainty to all fields.

$$\textit{Allocated out}_x = \frac{\sum \textit{out}}{\sum \textit{in}} * \textit{measured in}_x$$

Allocation by difference

- No measurements of the production for one of the fields/licenses, usually the main facility.
- The unmeasured production is determined by:
Field = Export – tie-in export
- To minimize the uncertainty on the unmeasured stream, the smallest producer should be measured and recommended not be more than 10% of the total production.

Field allocation by well production.

- Summarizing the production of the individual wells based on well allocation for a license.
- Used between licenses with equal or small difference in equity shares.
- No measurement to give the total in-stream.
- Is usually based on volume.
- High uncertainty.

Field allocation

- should be based on mass and not volume, since hydrocarbon flow from two different fields are not compatible homogeneous mixtures.

$$1\text{Kg} + 1\text{Kg} = 2\text{Kg}$$

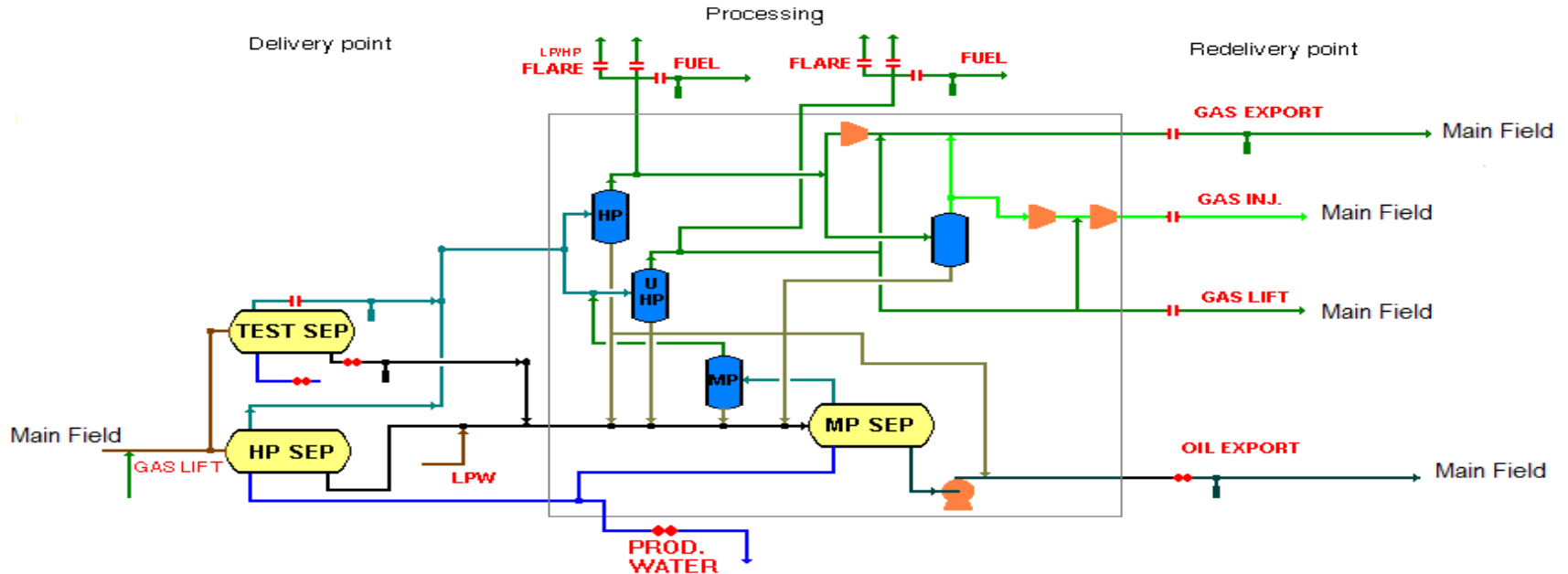
$$1\text{Sm}^3 + 1\text{Sm}^3 \neq 2 \text{Sm}^3$$

- Mass should be divided into mass and moles per component N₂, CO₂, C₁C₇₊ (or higher) and summarized pr component based on the component analysis of the fluids.

Allocation story...

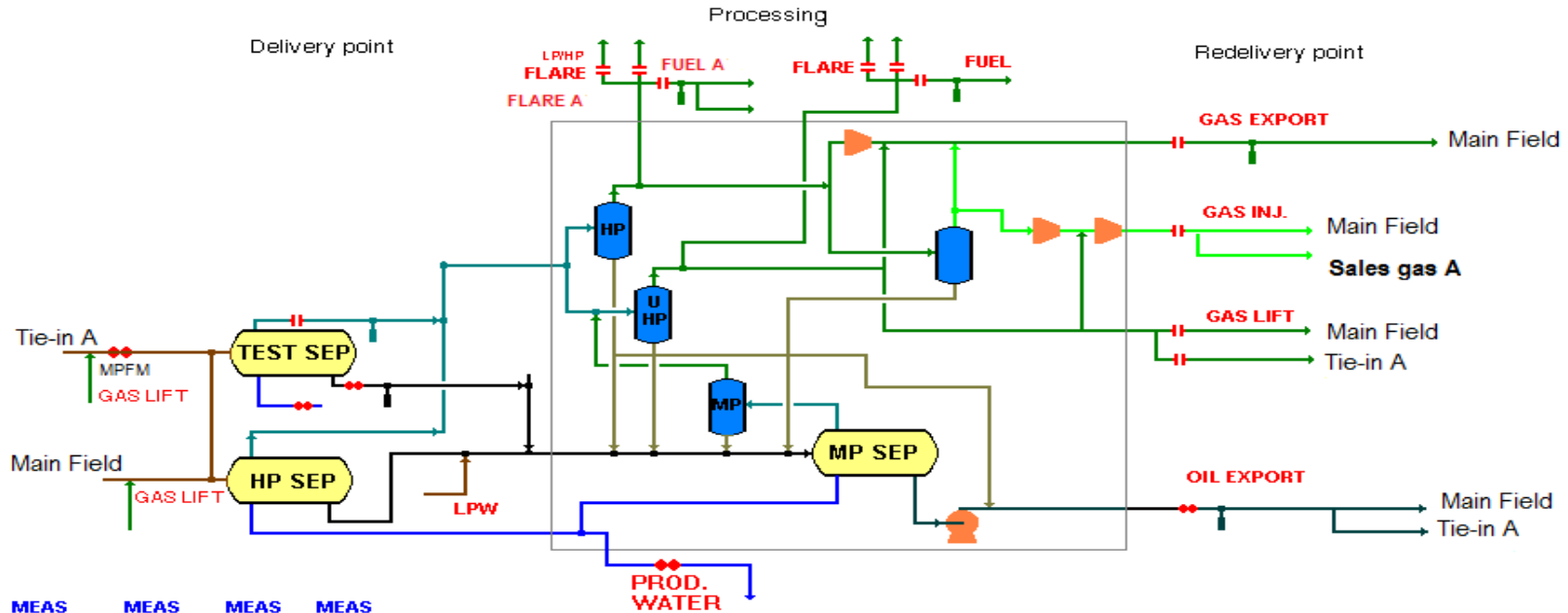
Once upon the time....

FIELD ALLOCATION

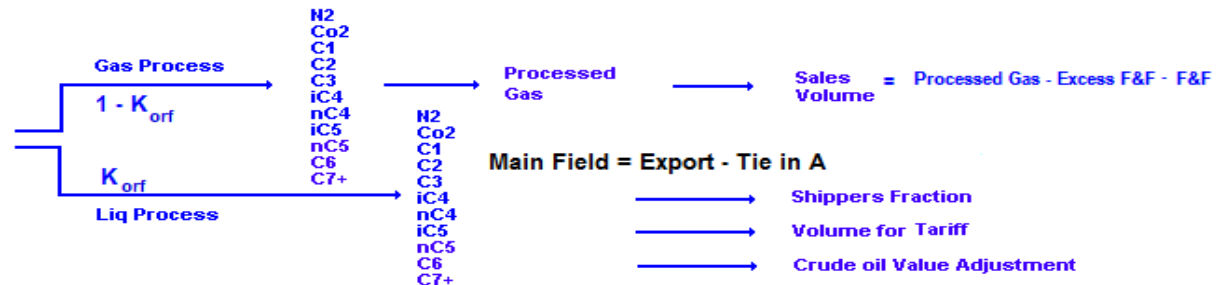


Then decline production and tie-in....

FIELD ALLOCATION



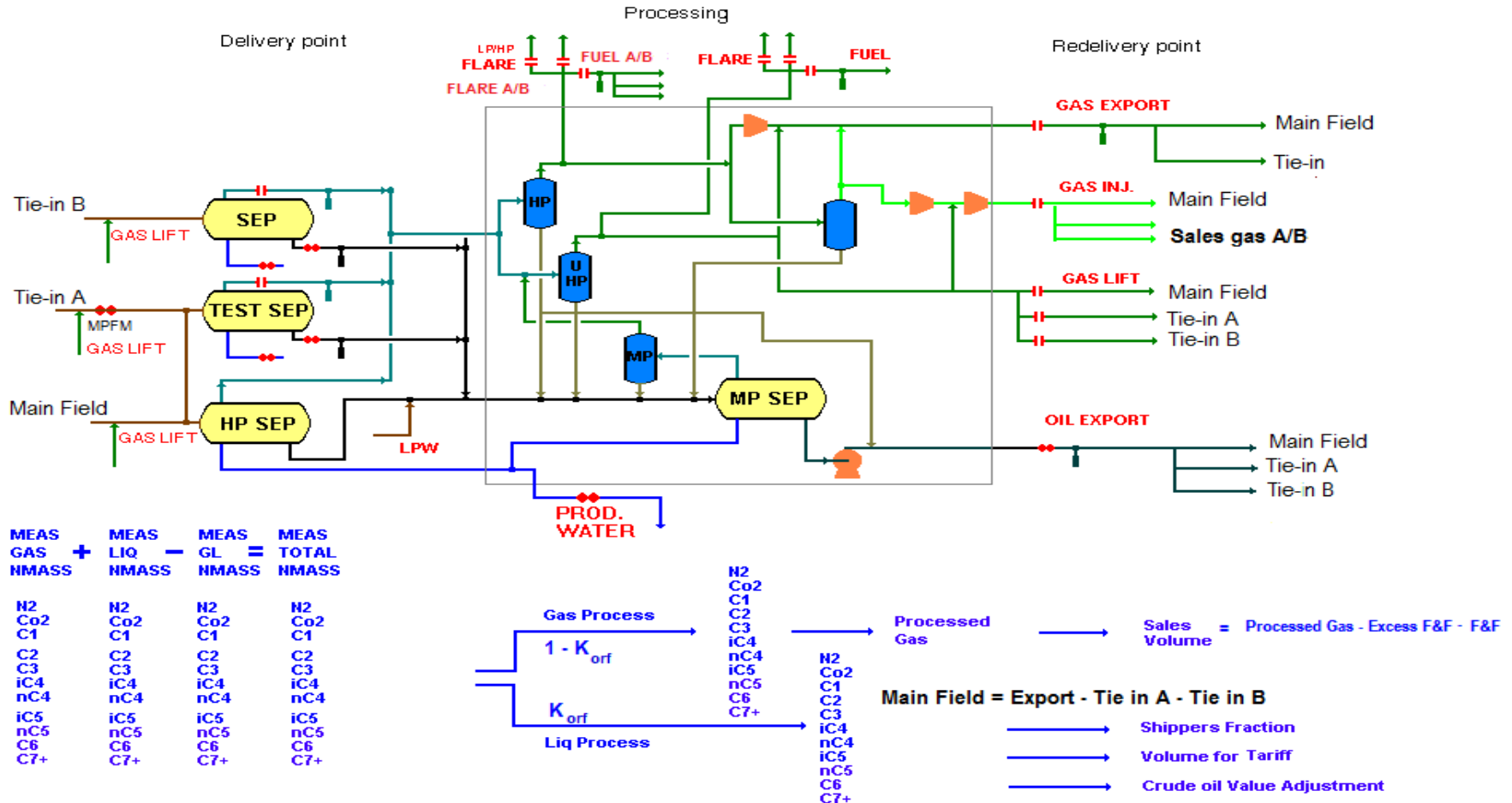
MEAS GAS NMASS	+	MEAS LIQ NMASS	-	MEAS GL NMASS	=	MEAS TOTAL NMASS
N2		N2		N2		N2
Co2		Co2		Co2		Co2
C1		C1		C1		C1
C2		C2		C2		C2
C3		C3		C3		C3
iC4		iC4		iC4		iC4
nC4		nC4		nC4		nC4
iC5		iC5		iC5		iC5
nC5		nC5		nC5		nC5
C6		C6		C6		C6
C7+		C7+		C7+		C7+



Decline production, spare capacity and new tie-in.

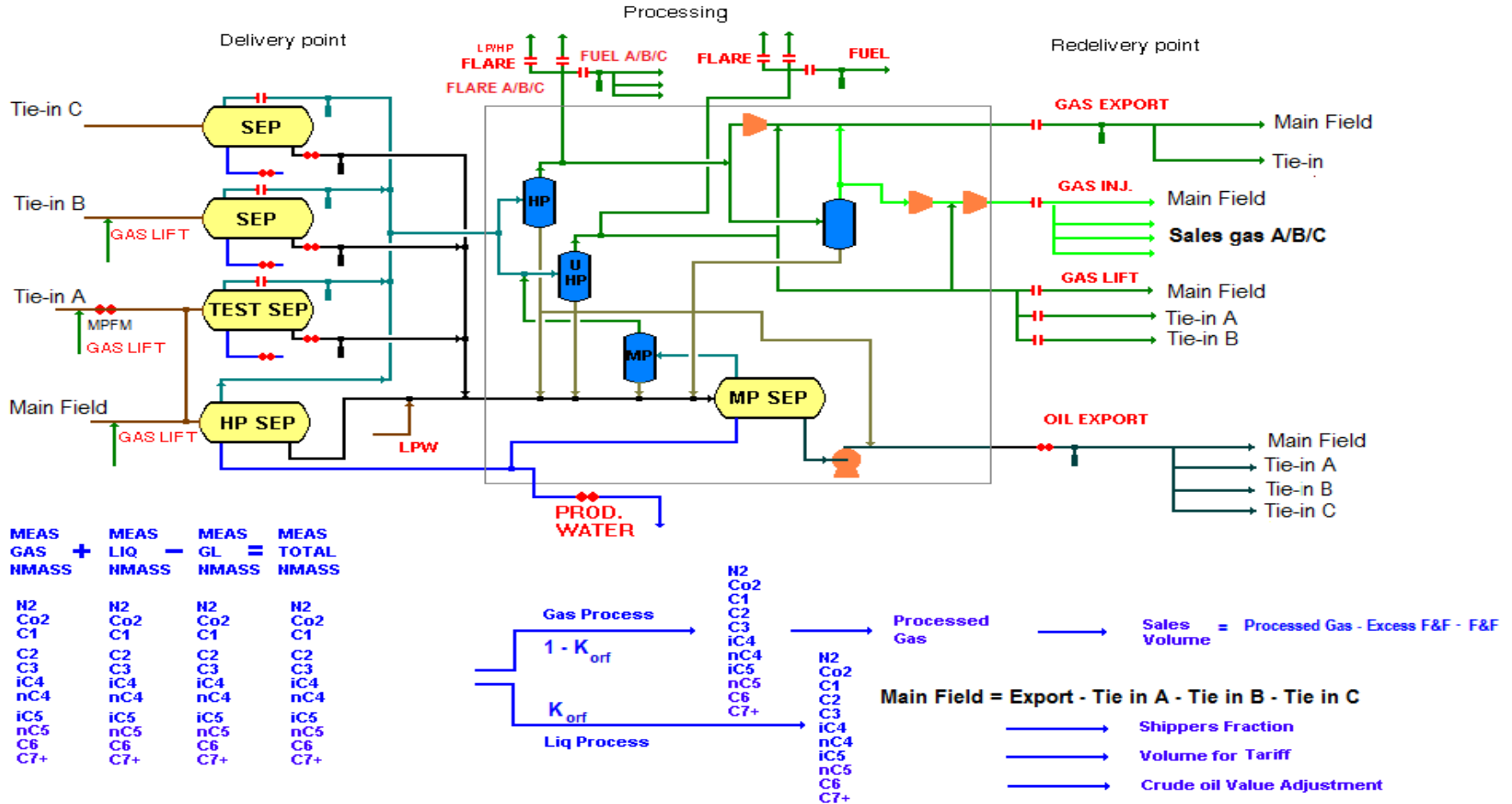
The facility is not the main producer anymore.....

FIELD ALLOCATION



Lived for ever more....

FIELD ALLOCATION



Questions?

- What is the uncertainty for the “by difference” field over the years?
- Do we have a common standard for this work, that include the process and capacity issues and not only the equipment uncertainty?
- How to handle corrections in complex allocation systems?