



NCS - HYDROCARBON ALLOCATIONS

SOME JV AUDIT EXPERIENCES

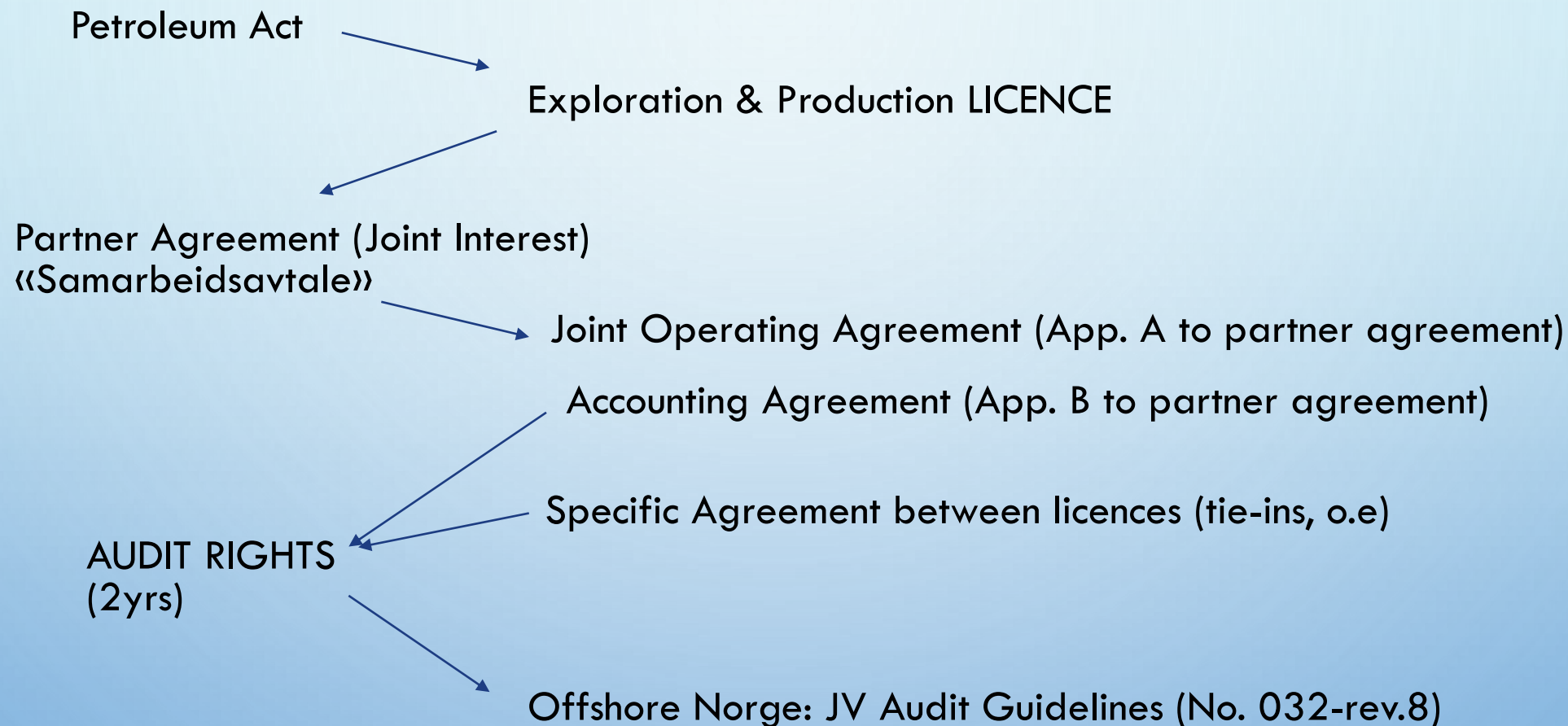
A PRESENTATION FOR NFOGM

Measurements and Allocation Audits

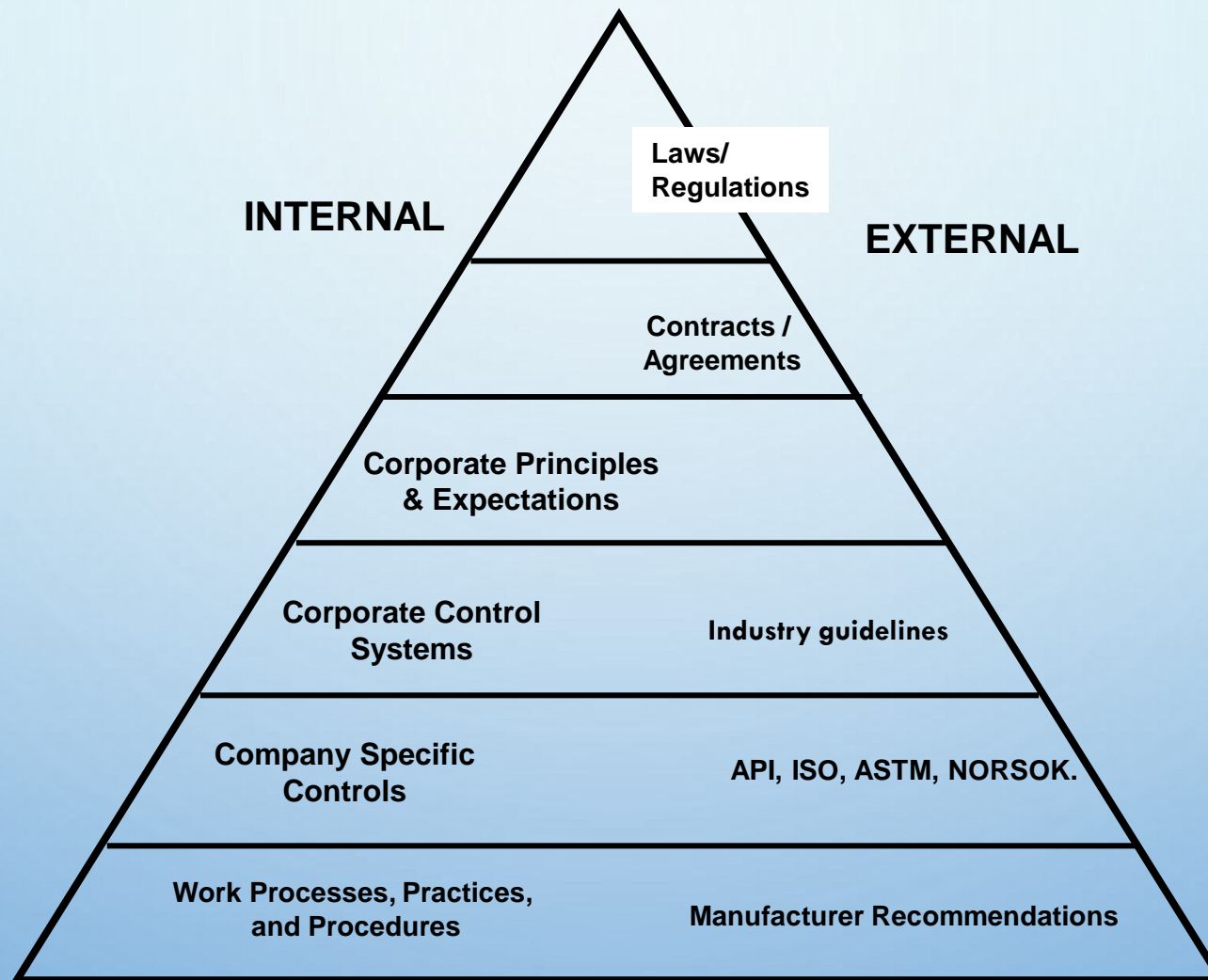
Measurements: How many hc molecules ?

Allocation: Who owns the hc molecules ?

Audit Rights in Oil and Gas operations



Typical regulatory hierarchy



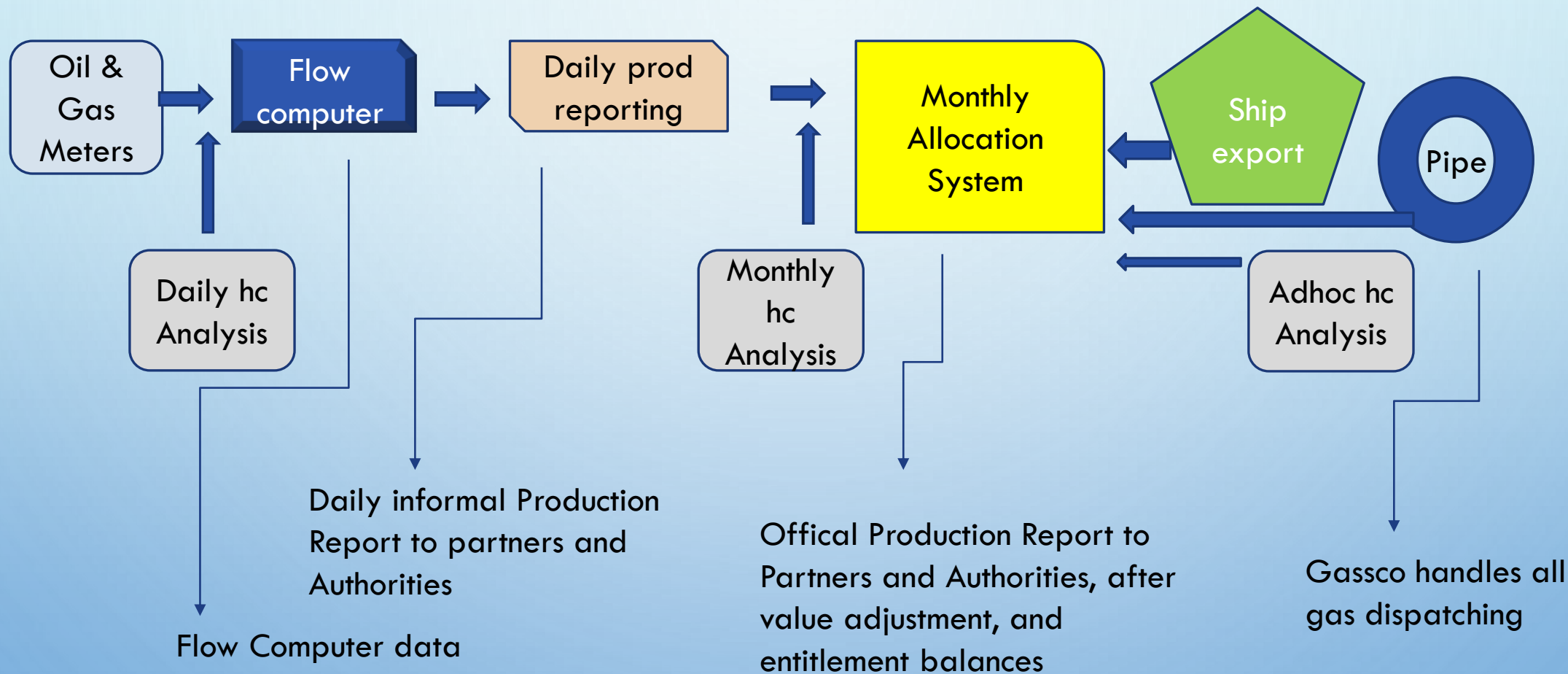
Agreements between producing fields

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3.3 Satellite Fields' allocated share of the Total Processed Oil C_{6+} components is determined by multiplying the Satellite Total Delivery of C_{6+} components (determined by adding Satellite Crude Oil, Satellite Separate Gas, Satellite Test Crude Oil and Satellite Test Gas) by the actual Oil Recovery Factor ("ORF") on a mass basis. ORF is the mass ratio of the C_{6+} components in Total Processed Oil to the C_{6+} components in Total Processed Oil & Gas.

Metering and Allocation Data Flow



Monthly Production and Allocation Reports

- Calculates Monthly Volumes and Mass of total oil and gas produced
- Allocate per field/installation; typically based on mass per hc components (C1 /C2/C3, etc.)
- Allocate total consumed fuel gas and flare gas to respective fields
- Calculation of crude oil value adjustment of the various oil streams, based on Platt market prices and refinery yield (naphta, kerosene, gasoil and fueloil with some adjustments) . Value used to redistribute share of export blend oil
- Operator collects gas dispatch data from Gassco for each shipper/owner
- Monthly Gas Accounts Report per owner
- Owners stock and liquids production entitlements and lifting balances

JV Audit Process HC Measurements & Allocations

- JV measurement and allocation audits follows the Norwegian JV audit guideline ;
- Preparation:
 - Audit shedule established in previous year's annual JV audit planning mtg, both financial (2023: 74) and hc measurement & allocations (2023: 10)
 - Lead Auditor nominated amongst the partner companies and submits Invitation to participate to other partners, and a Notification to the Operator. It has sometimes been a challenge to find qualified personnel to participate. Lack of Operator data at start of audit can be a challenge
- Execution of Audit:
 - Part of audit team in office and part of team out in field, could also be split in who review which field data to avoid confidentiality violations. Sometimes a challenge to visit installations
 - Helpful to use Fieldwork Start and Exit summary presentations
- Reporting:
 - Follow-up mtg., final report issue acc. to guideline. Some Lead Auditors prefer to issue a draft report for comments. Findings classified as Audit Exceptions or Audit Recommendations



Hands on Experience – Allocation Audits

- Challenge to understand all relevant tie-in agreements
- Typically the monthly allocation process is based on a computer system that uses input from the various sources to put together an adjusted report. Challenge to verify correct set up of input data points and algorithms.
- Process may involve use of a number of spreadsheets for calculation of volume and mass which is difficult to review without seeing formulas
- Value adjustment of liquids are based on international price indexes and refinery yields for the various field streams. Lab data can be used wrongly
- Helpful to trend production component data across whole audit period
- Review example with Operator expert on how system is set up is useful

Some Recent Audit Findings

Commercial agreements not followed.

The detailed processing of allocation data given in the agreement not entirely followed as Operator has either misunderstood the intension or have a specific view on how to implement. Examples: Operator did not apply Component Recovery Factors correctly as per tie- in agreement. Sample frequency of well stream analysis for allocation not in line with agreement. Allocation procedure verification step not followed. Example of value adjustment not done in line with agreement

Inconsistencies between tie in agreement main text and sub paragraphs and procedures

Examples have been found where the detailed description of how to allocate mass/volumes differs from the principles given in the main agreement text

Lack of updating monthly reports from corrected daily reports

Normally system set up to automatically recalculate daily numbers as corrected but some cases where errors are found, like lack of publishing to L2S

Difference in production figures submitted to partners vs. NPD

Some Recent Audit Findings, cont.

Incorrect use of laboratory data from testing of oil (and in some cases gas)

Use of non normalized data that creates a bias

Which gas cut to use in calcs (flash/distillation gas). No deduction of inert gases.

Incorrect calculation of oil value adjustment

Incorrect Platt price and volume data used in spreadsheet calculation. Use of wrong weight cut compared to agreement. Not all cuts were used in the value calculation. Incorrect calculation of sulfur and viscosity effects on valuation process.

Wrong allocation of fuel and flare

Many finding have been recorded of incorrect allocation of fuel and flare gas between tie in-fields and host platform. Attributable vs. common fuel gas not defined correctly. F+F allocation based on BOE from export rather than share of oil production. Lack of updating preliminary daily figures to monthly allocation report



Some Recent Audit Findings, cont.

Wrong application of density data

Mix of volume and mass data from metering could create inconsistencies. Density in air and density in vacuum sometimes applied incorrectly. Example: Using density in vacuum when weight in air was calculated for ship export. Use of blend density instead of lifted density for offloading

Errors in Deferral of Oil and Gas

Errors have been found in managing these deferrals, like calculation based on preliminary daily figures ex. line fill and value adjustment. Deferral in gas entitlement booked in volume instead of energy. Associated fuel and flare for the gas deferral volumes between two fields allocated to wrong field. Lack of overview of deferral calculations and accounts.



Some Recent Audit Findings, cont.

Use of BOE on export gas instead of gas throughput as basis for Opex sharing

Use of previous month's Oil Recovery Factor without adjustments

Flare allocation sum larger than total measured flare

NOx fee calculated on previous month's fuel split

New shrinkage factors not applied in allocation between fields resulting in large oil correction

No control with who lifts oil from each of two platforms with different oil quality, all sold as Blend Oil

Some Recent Audit Findings, cont.

Allocation of production to one satellite field based on highly uncertain measurement data

Reallocation of a satellite field to main field done to wrong equity owner

Limited validation of simulation models to determine ORF for allocation

Use of storage measurement with high uncertainty for platform monthly opening stock level

Mass imbalances on component basis noted on a field center input vs output streams that may influence the allocation

Lack of gas accounting procedure for all commingled fields

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