

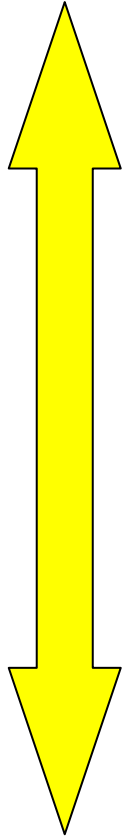
Measurement and Control System for Midstream Plant

August 6th, 2004

Yoshinori Sato

JGC Corporation

1. Concept of Midstream Plant



UPSTREAM

- Off Shore
- On Shore

MIDSTREAM

- GOSP (Gas Oil Separation)
- FPSO
- (Floating, Production, Storage and Offloading)

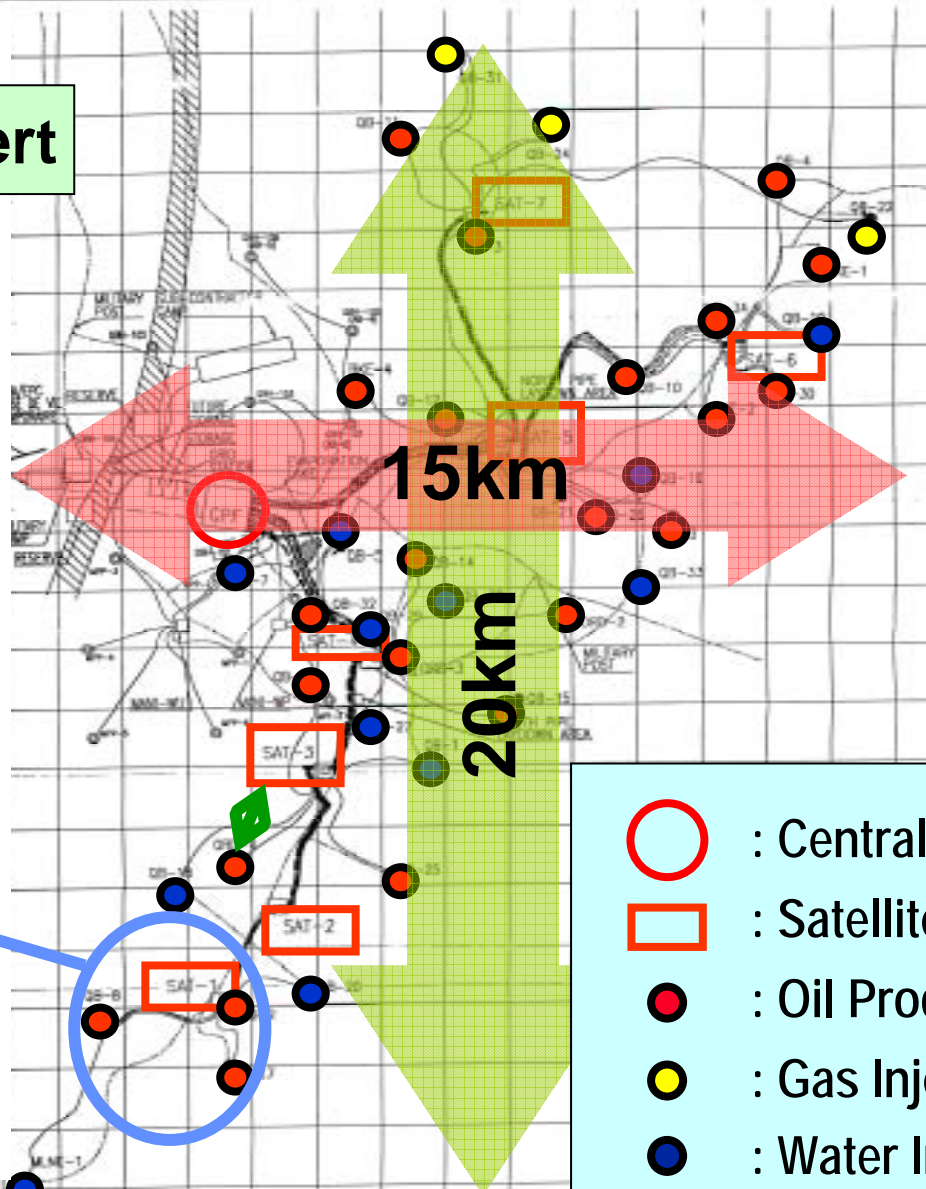
DOWNSTREAM

- Gas Plant
- LNG
- Refinery
- Petrochemical

2. Site Location

Center of Desert

Distance between
 Satellite and
 Wellhead **3 – 5 km**



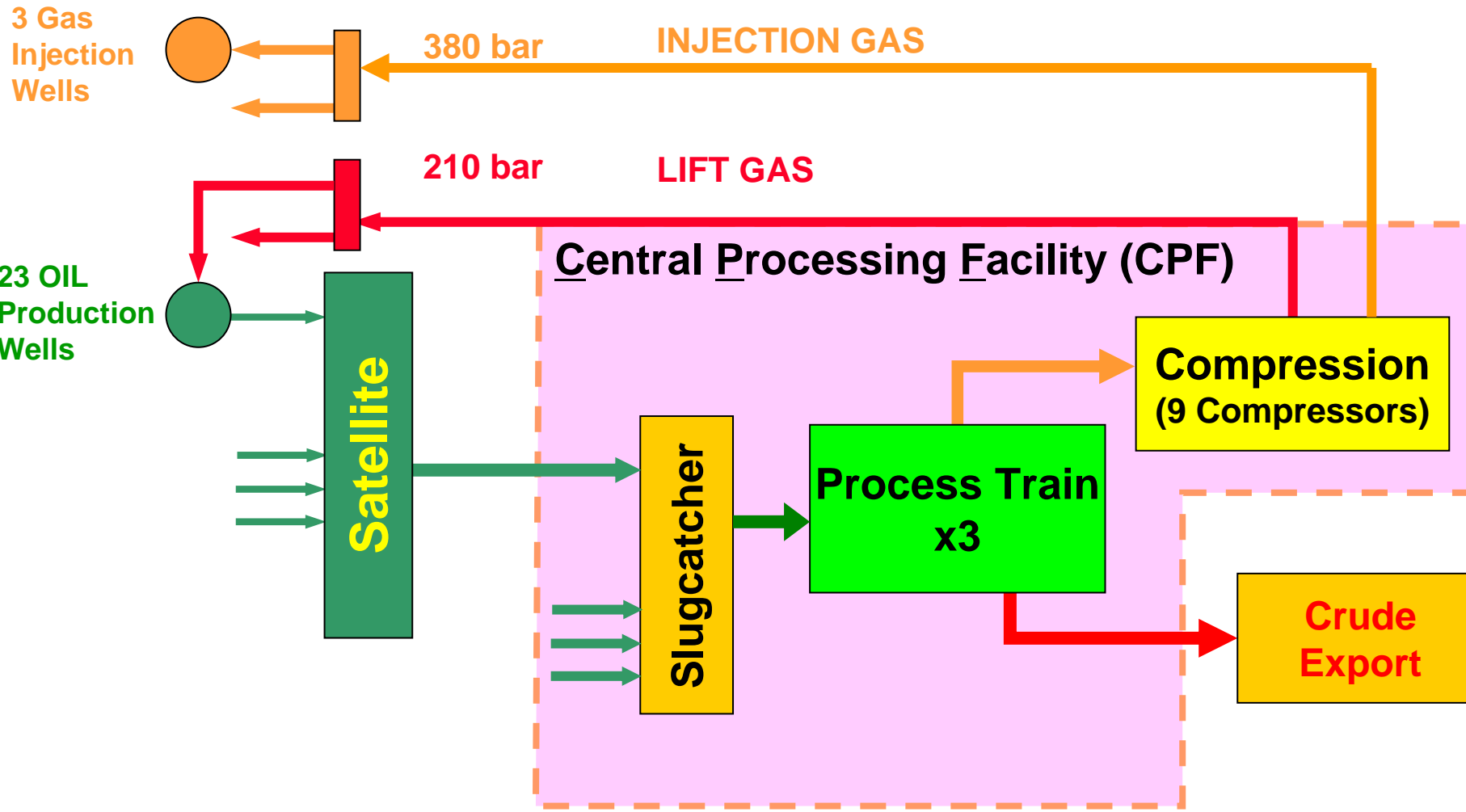
- : Central Processing Facility
- : Satellite
- : Oil Production Wellhead
- : Gas Injection Wellhead
- : Water Injection Wellhead

Harsh Ambient

- ➔ Sandstorm
- ➔ Maximum Temperature 60
- ➔ Strong Sunshine



4. Process Overview

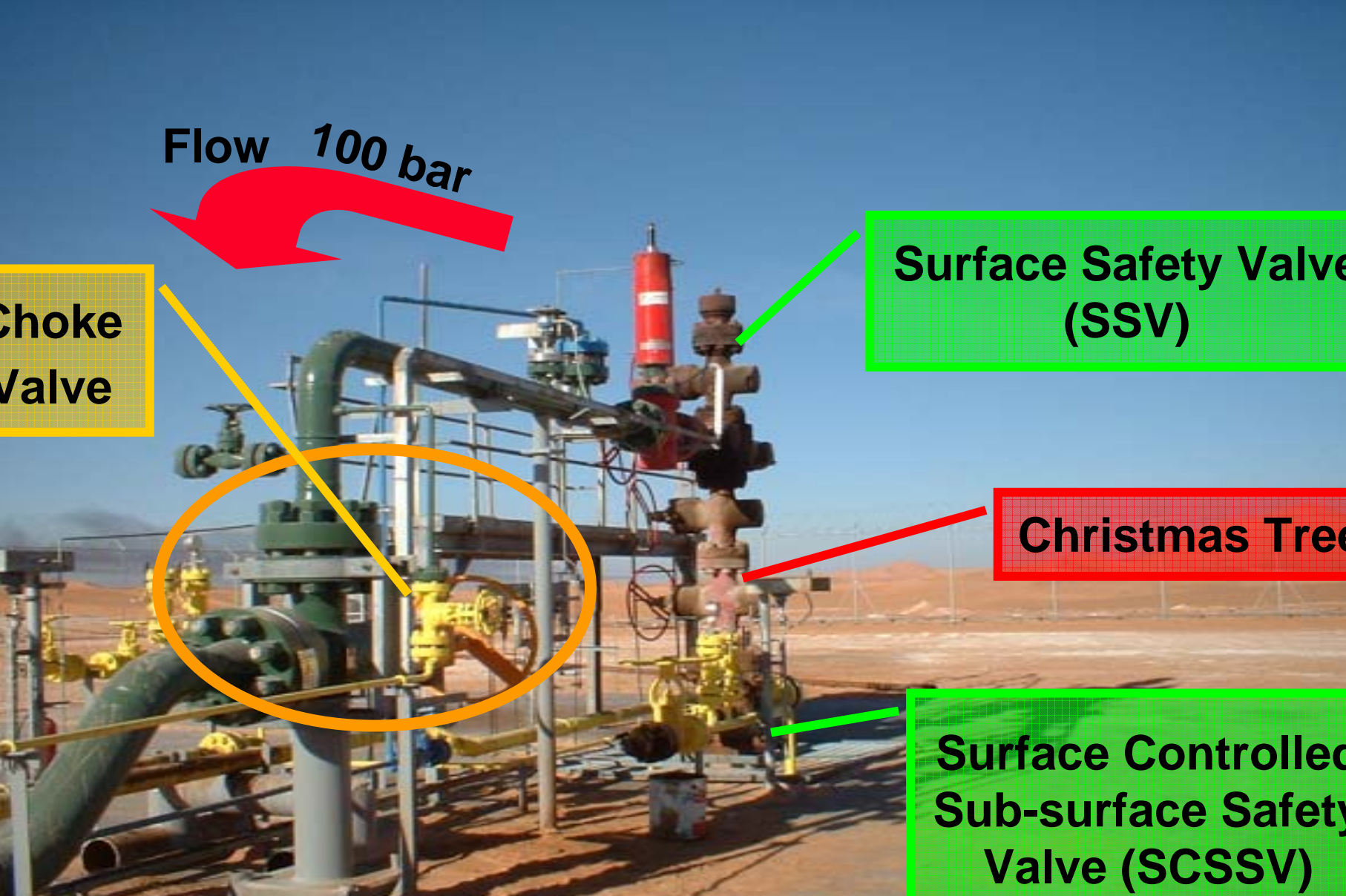


5. Well Digging

- **Drilling Contractor ---- Digging Specialist**
- **Risky Business**



6. Oil Production Wells



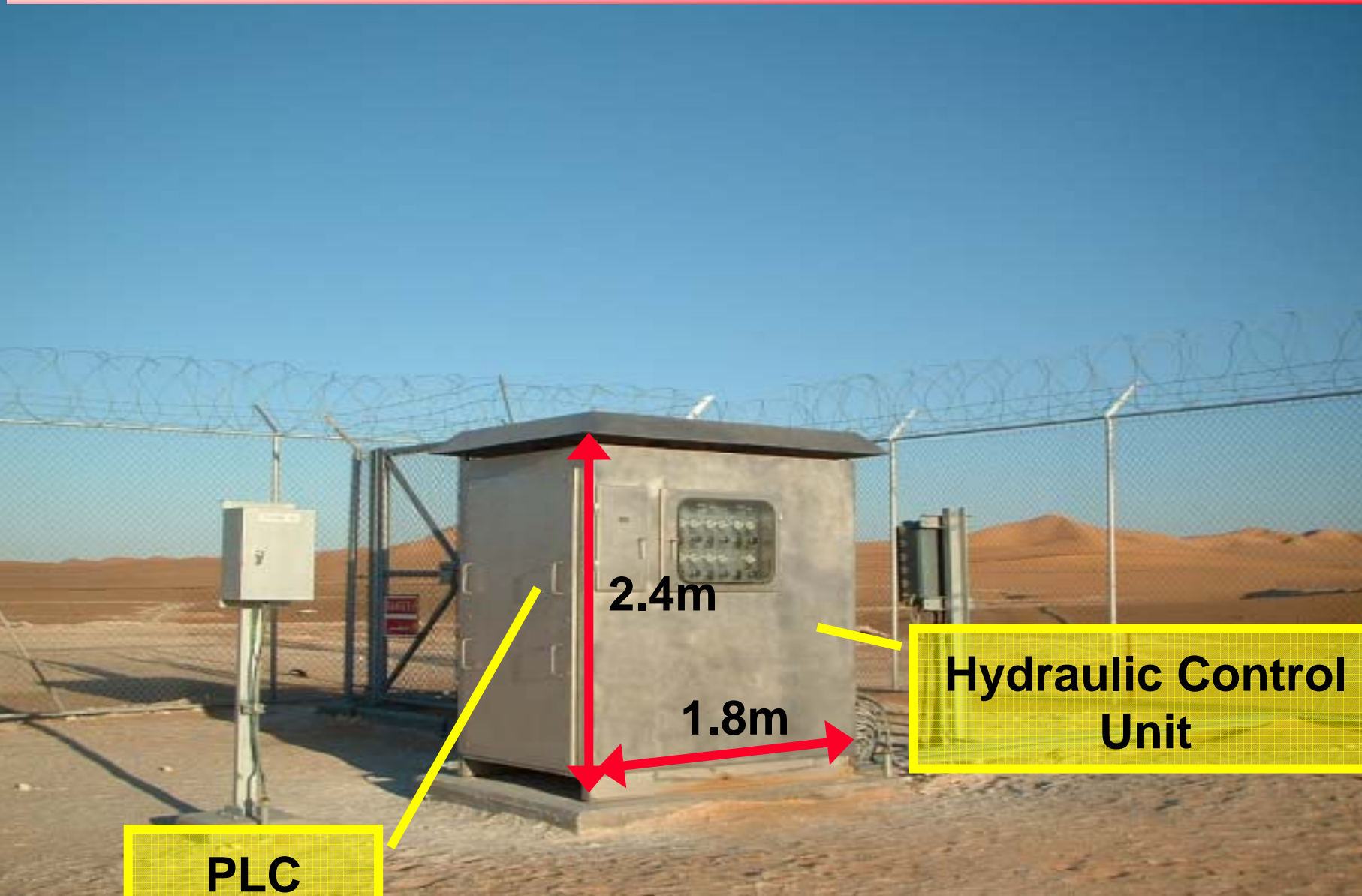
Flow 100 bar

Choke Valve

Surface Safety Valve (SSV)

Christmas Tree

Surface Controlled Sub-surface Safety Valve (SCSSV)



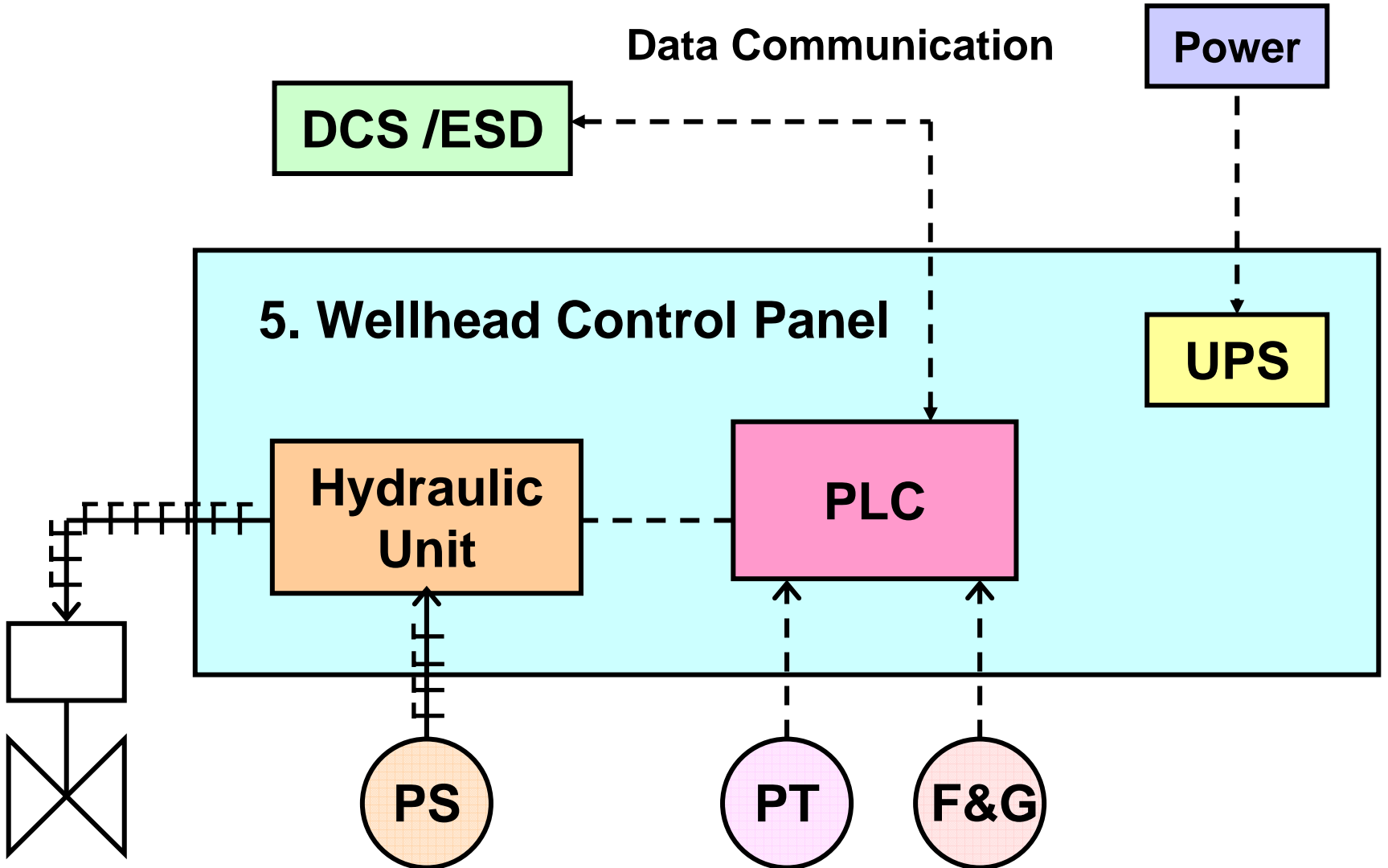
2.4m

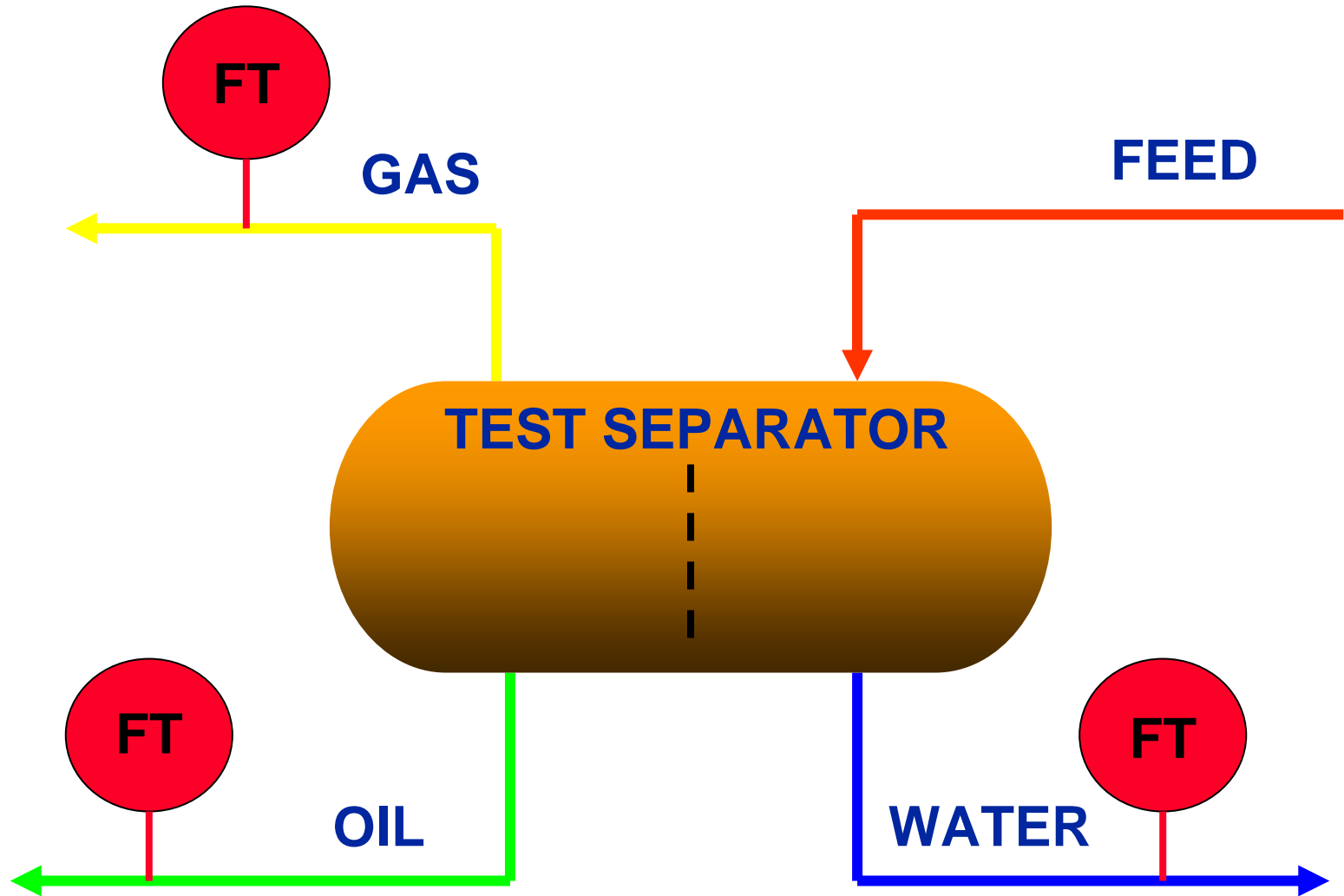
1.8m

PLC

Hydraulic Control Unit

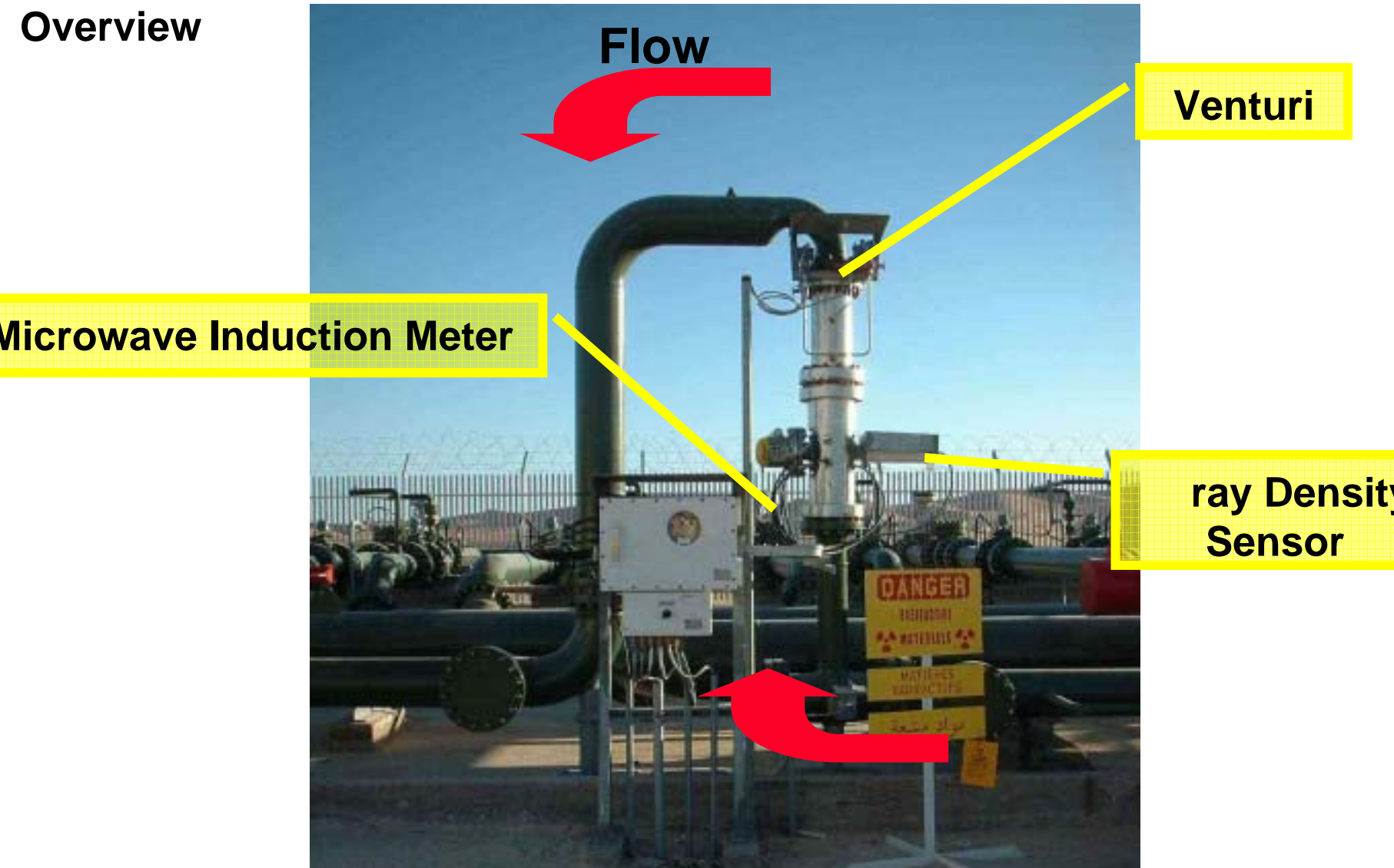
7. Wellhead Control Panel





Multi-Phase Measurement by Test Separator

Overview



Flow

Venturi

Microwave Induction Meter

ray Density
Sensor

DANGER

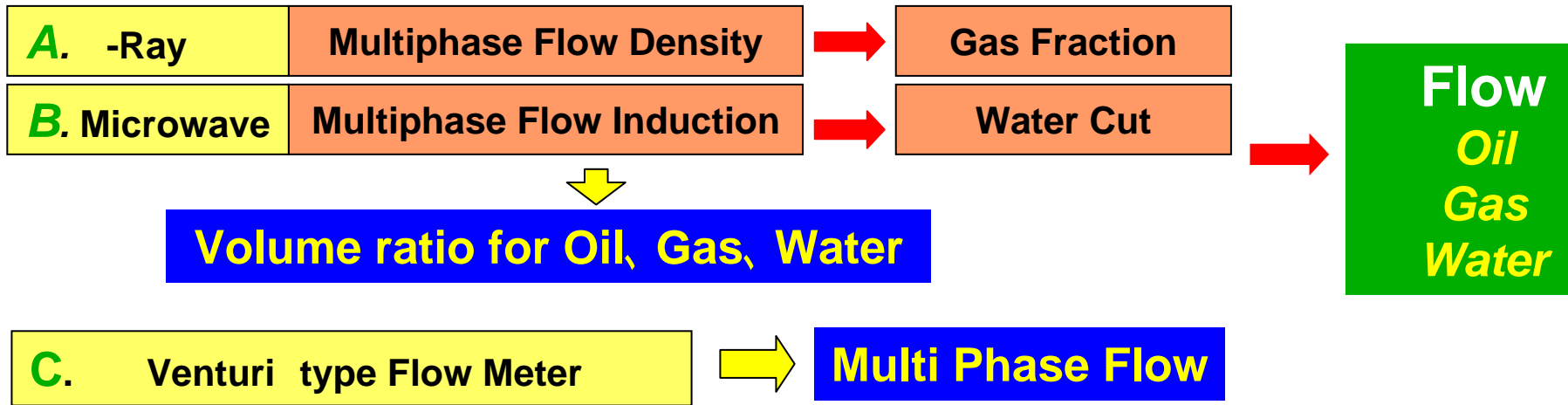
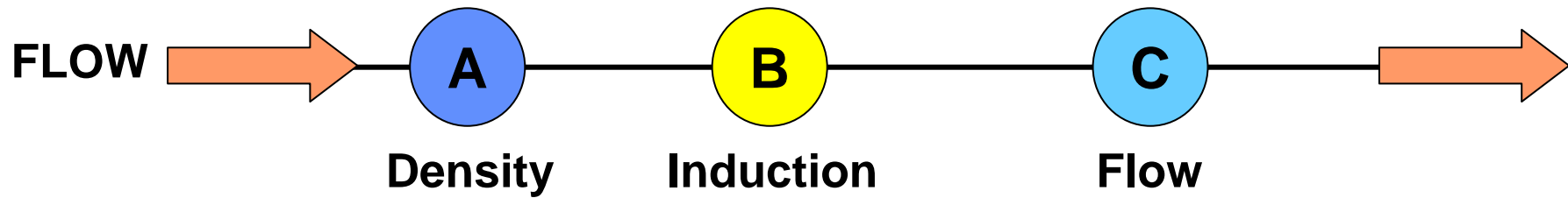
رادیو اکتیو

☠ RADIATION ☠

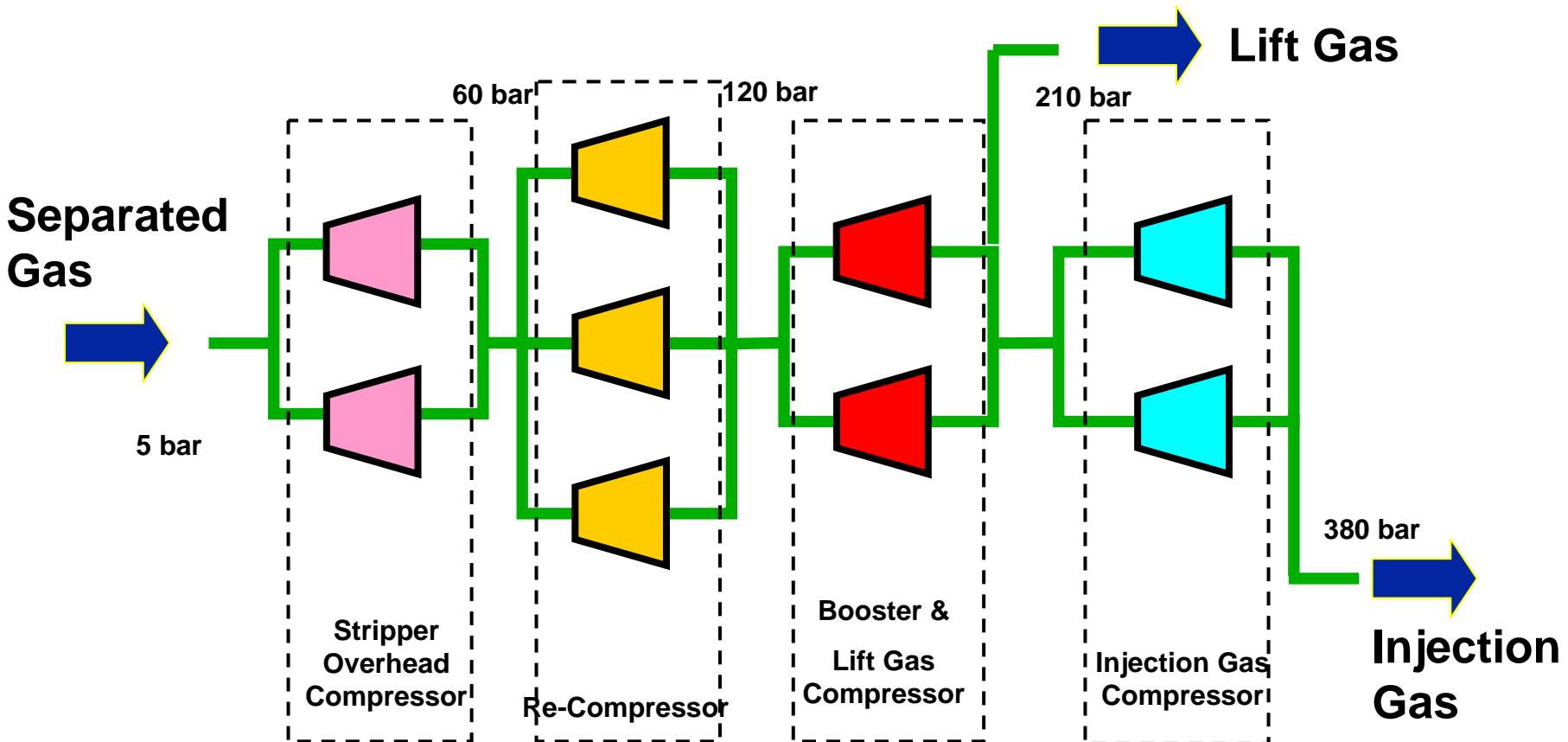
MATIERES RADIOACTIVES

مواد مشعاع

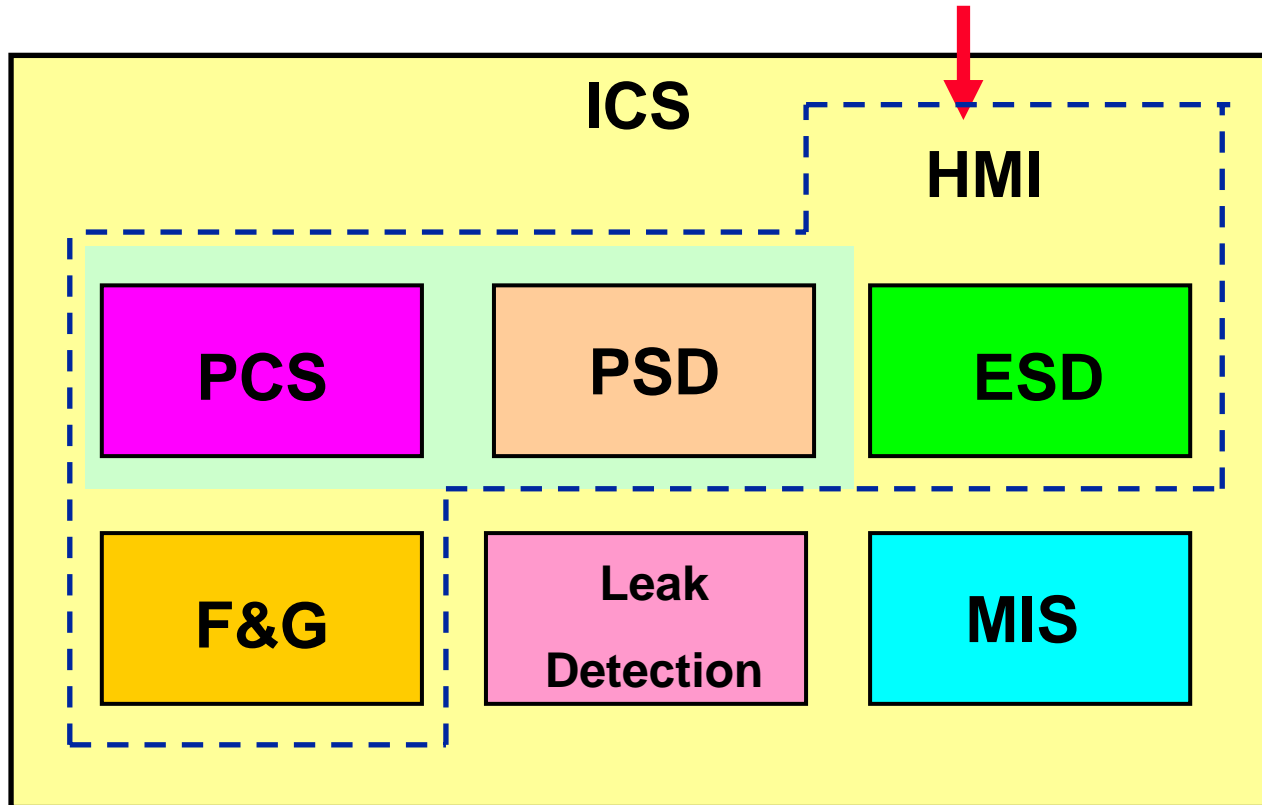
◆ Oil Contents (Oil, Gas and Water) On-line Analysis



4 Stages Cascade Gas Compression



Single Window Operation



- ◆ **Flexible System**
- ◆ **Single Window Operation
(Central Operation)**
- ◆ **Subsystem Communication**
- ◆ **Long Distance Communication**

12. Flexible System

- ◆ Determination of Well Location is the risky part.
- ◆ Number of wells connected to the Satellite is unfixed.
- ◆ System Communication is Unfixed.



- ◆ System Architecture must be flexible.



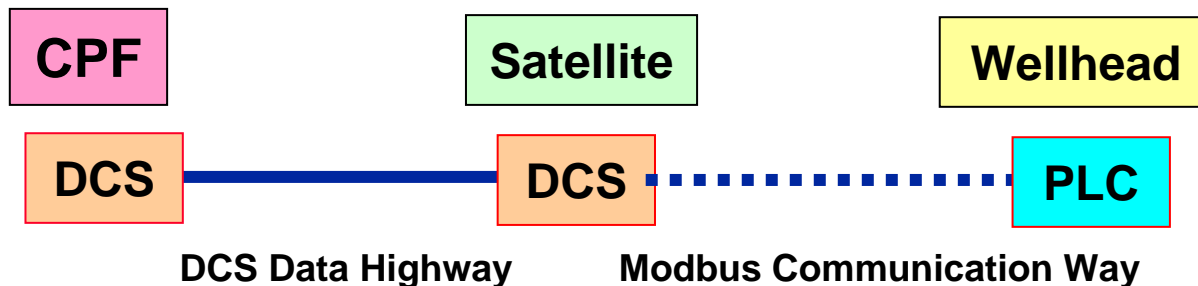
- ◆ Function Module Engineering is effective.

◆ SCADA system is not used.



◆ DCS system communication bus is extended by the single-mode optical cable.

◆ Modbus communication way is provided using the single-mode optical cable.



1. Material selection for field instruments against harsh ambient condition is important.
2. Well digging is risky part and flexible system is required.
3. Multi-phase flow meter is used for crude oil contents analysis.

4. Long distance communication is key part of the control system.

5. Integrated control system with subsystem communication as single window operation is realized.

Thank you for your attention!