

NPS 40" New Pipelines

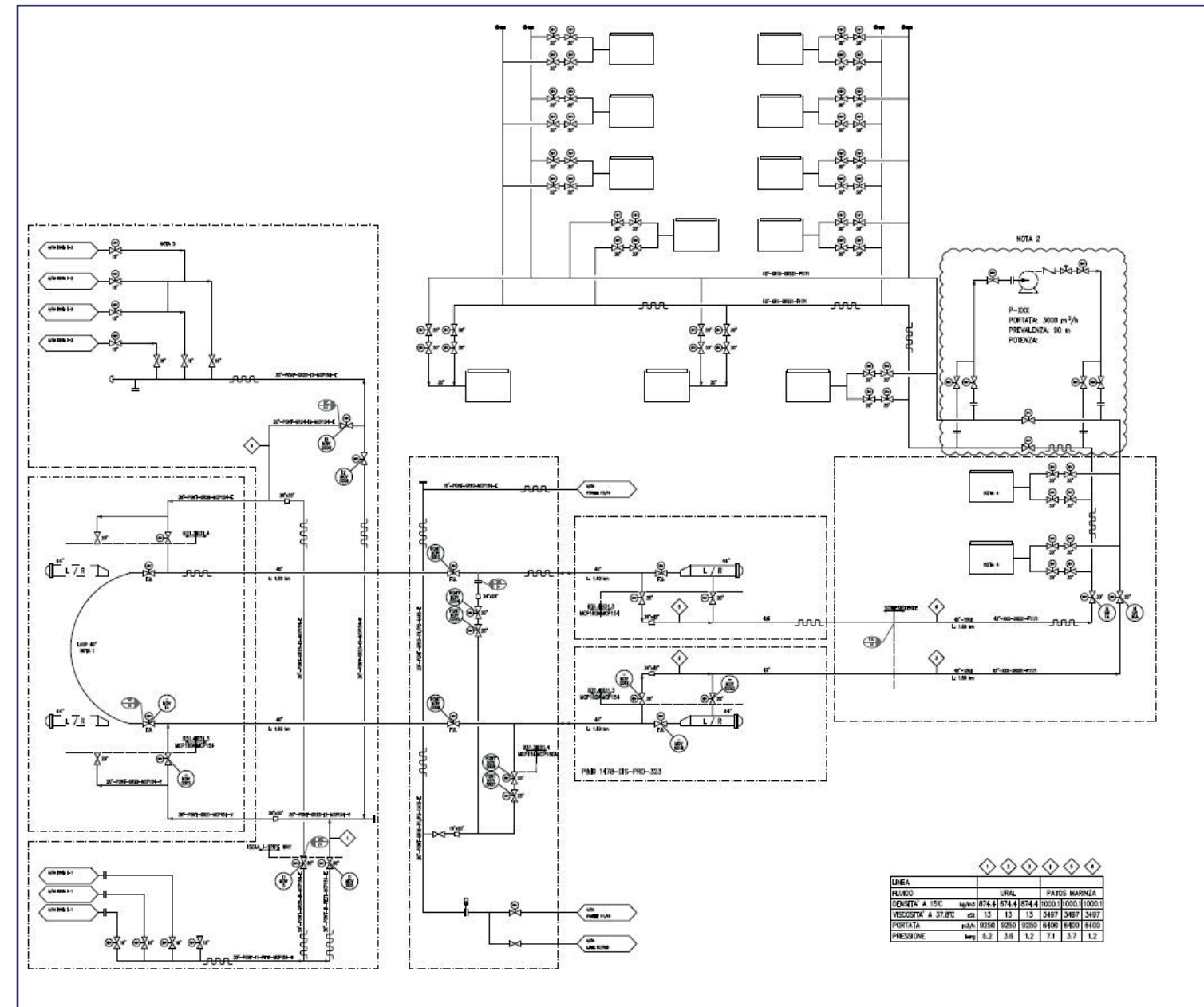
Design of two 40"
new pipelines on
a 3 km long jetty

Introduction

Scope of Work

Design of two 40" new pipelines on a 3 km long jetty.

- **First Step:** Basic Engineering
- **Second Step:** Detail Engineering
- Pipeline related Special Activities

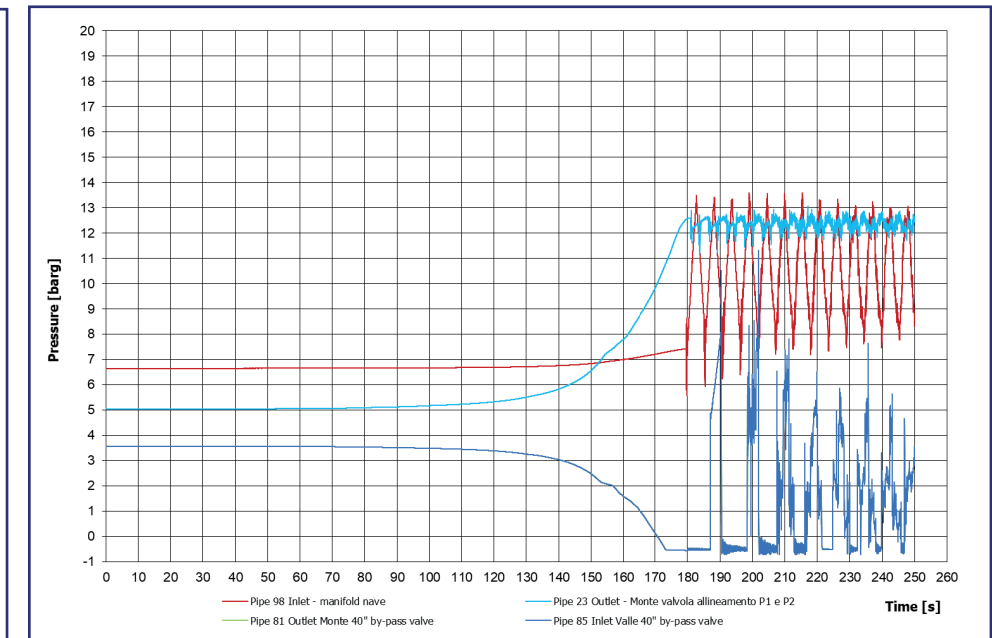
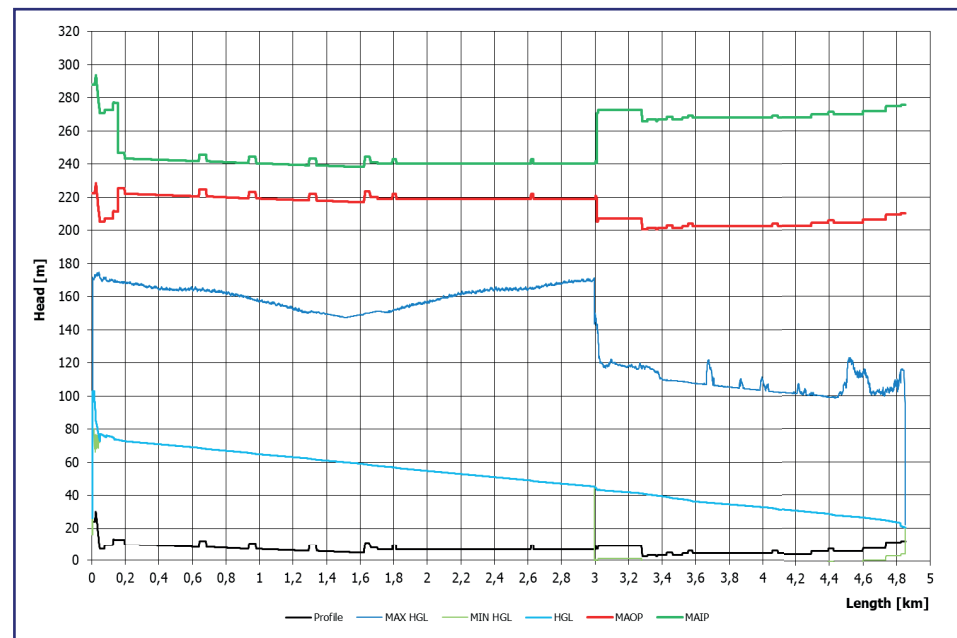
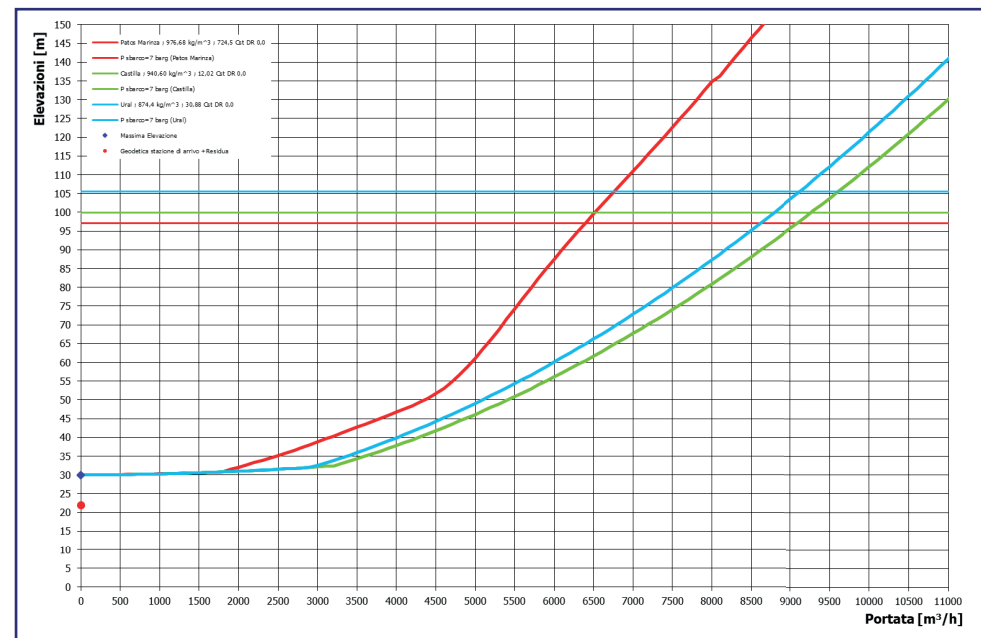


Basic Engineering

Pipelines Flow Assurance

- **Steady-State Analysis**
 - System Characteristics Curves
 - Hydraulic Gradelines for different Crude Oils
- **Transient State Analysis**

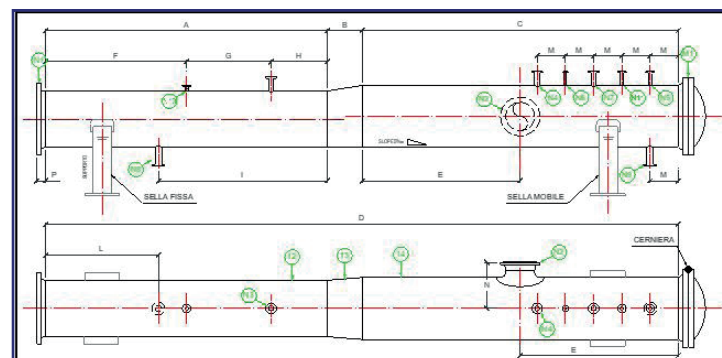
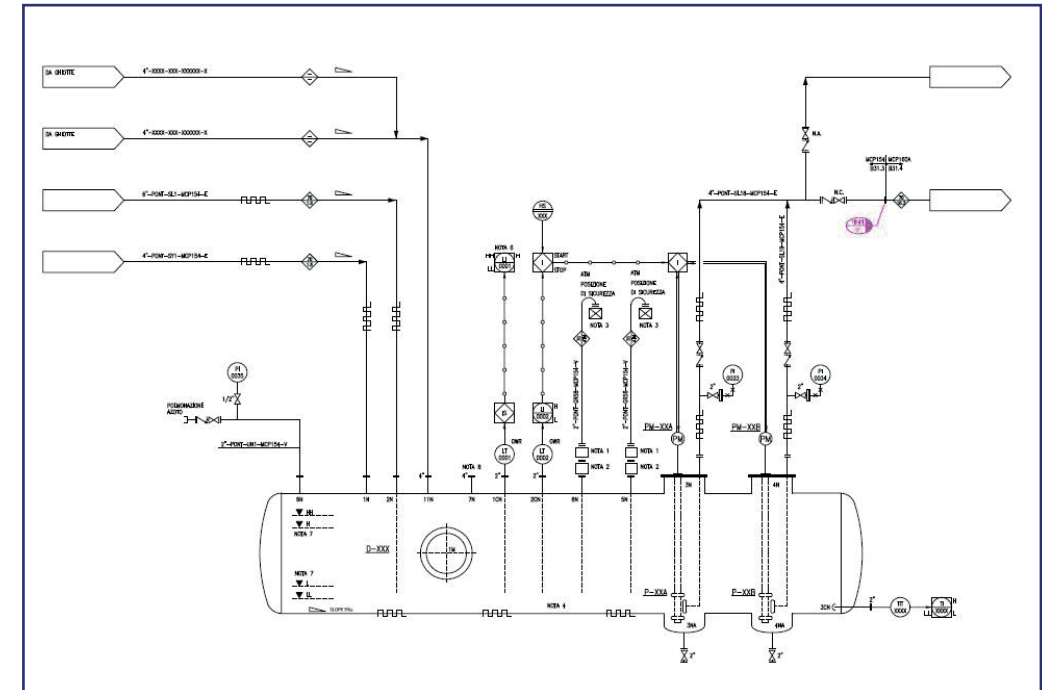
Thickness Calculations and Design Code Verification



Basic Engineering

Process Engineering

- P&IDs
- Process Data Sheet (Valves, SLOP, TRV,...)
- Line sizing
- Operating and Pigging Philosophy



LISTA MATERIALI / CONNESSIONI (Nota 4)							
TAG	SERVICE	DIAM.	CONNEC.	RATING	FACING	THICK.	MATERIALS (Nota 3)
N1	COLLEGAMENTO OLEODOTTO	40"	FLANGIA	150#	RF	12,7 mm	HOLD
N2	KICKER LINE (NOTA 5)	20"	FLANGIA	150#	RF	6,35 mm	MSS SP44 F 52
N3	LINEA DI BILANCIAMENTO	3"	FLANGIA	150#	RF	HOLD	MSS SP44 F 52
N4	LINEA DI BILANCIAMENTO	3"	FLANGIA	150#	RF	HOLD	MSS SP44 F 52
N5	STRUMENTAZIONE PI-PT	2"	FLANGIA	150#	RF	HOLD	MSS SP44 F 52
N6	TRV	1"	FLANGIA	150#	RF	HOLD	MSS SP44 F 52
N7	VENT A BLOWDOWN	3"	FLANGIA	150#	RF	HOLD	MSS SP44 F 52
N8	DRENAGGIO CORPO MINORE	4"	FLANGIA	150#	RF	HOLD	MSS SP44 F 52
N9	DRENAGGIO CORPO MAGGIORE	4"	FLANGIA	150#	RF	HOLD	MSS SP44 F 52
N10	SEGNALATORE PIG		HOLD				
N11	VENT ATMOSFERICO	2"	FLANGIA	150#	RF	HOLD	MSS SP44 F 52
12	CORPO MINORE	40"	BW	150#		12,7 mm	L 360 N
13	RIDUZIONE ECCENTRICA	40"x44"	BW	150#		12,7 mm	L 360 N
14	CORPO MAGGIORE	44"	BW	150#		12,7 mm	L 360 N
M1	CHIUSURA RAPIDA	44"	BW	150#		HOLD	MSS SP 44 F 52

Pipeline Engineering

- Main Line equipment sizing and specification
- Data Sheet & Specification of main line equipment (Line Pipe, Pig Trap, Long radius Bend, MLV, Barred Tee,...)

Detail Engineering

Detail Process Engineering development

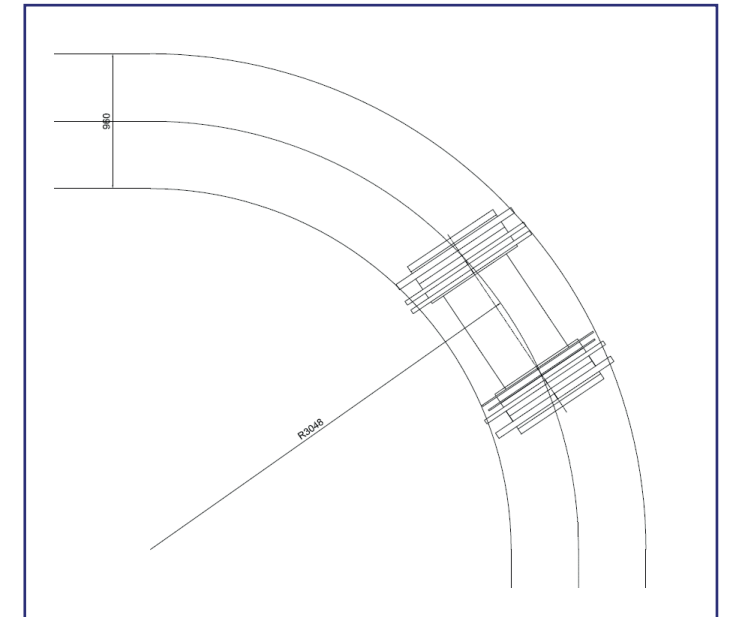
- P&IDs
- Data Sheet
- Lists

Support to plot plan and piping drawing

Technical Alignment

Vendor Follow-up

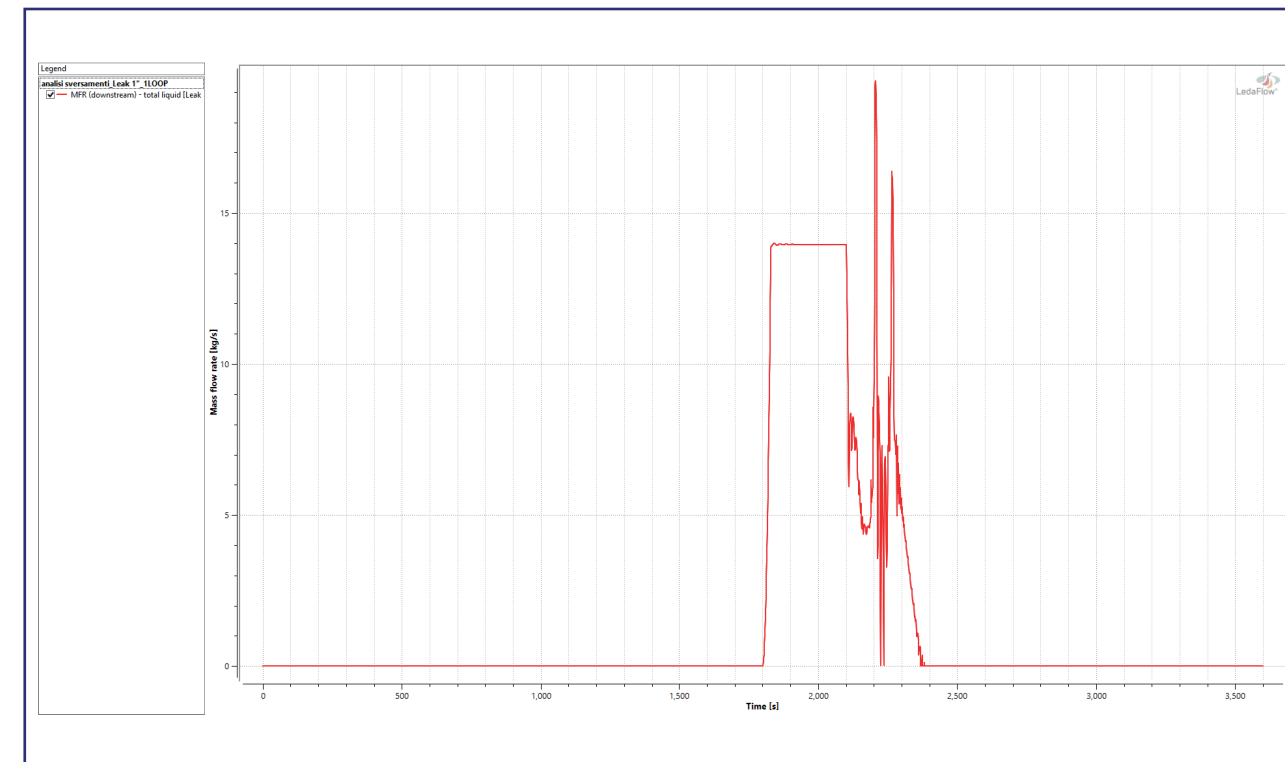
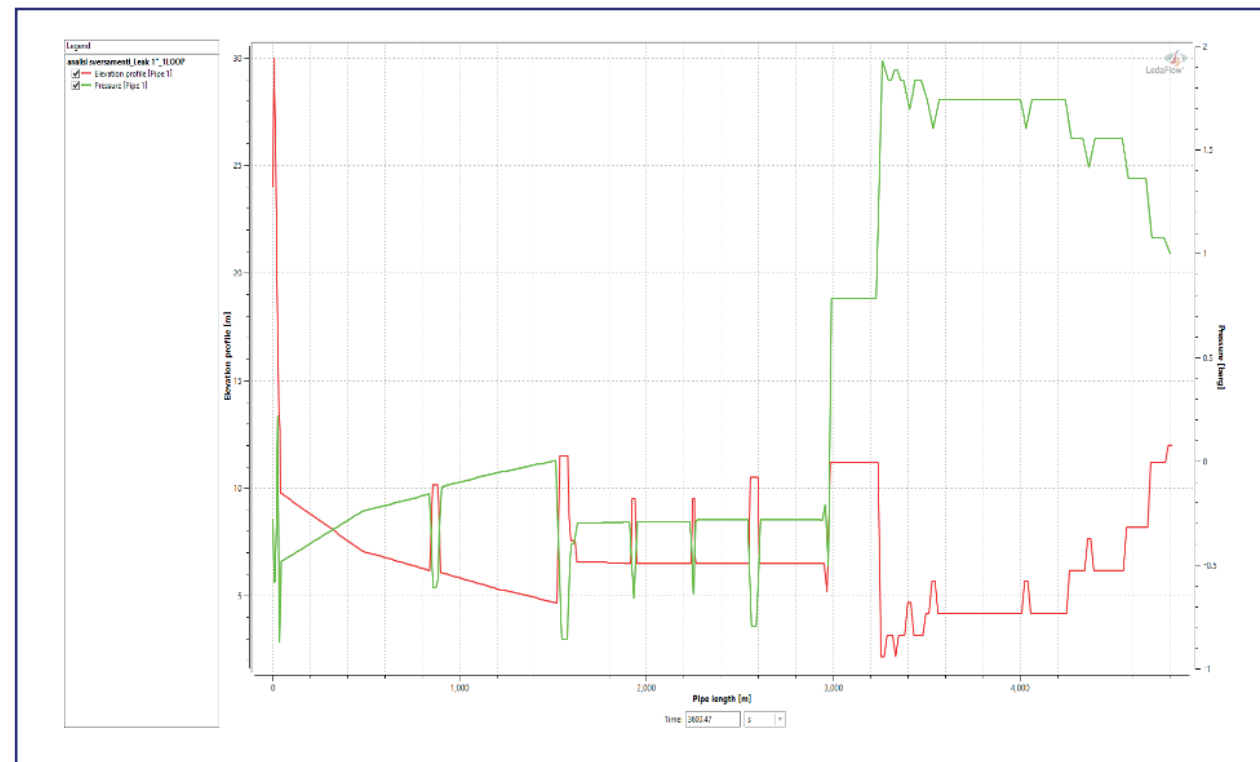
- Line Pipe
- Long Radius Bend and Pigability Tests
- Barred Tee
- Main Line Valve



Special Activities

Leakage Analysis

- **Scope:** Spill volume reduction with vertical Expansion Loop
- **Methodology:** Spill volume calculation in a rupture case
- **Software:** LedaFlow - Multiphase Flow Simulator



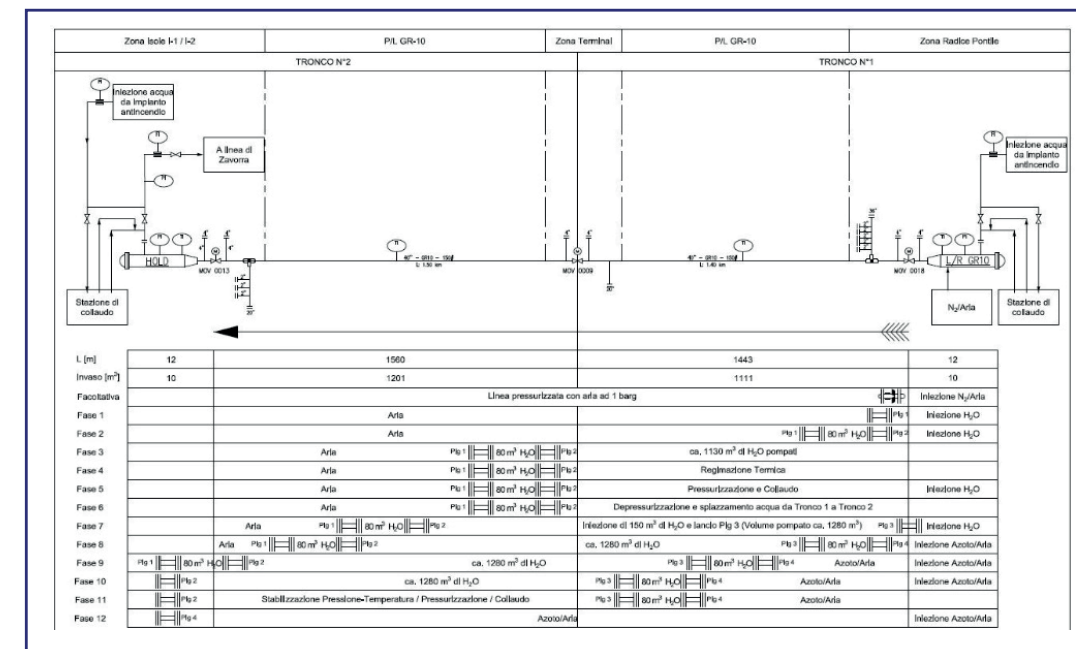
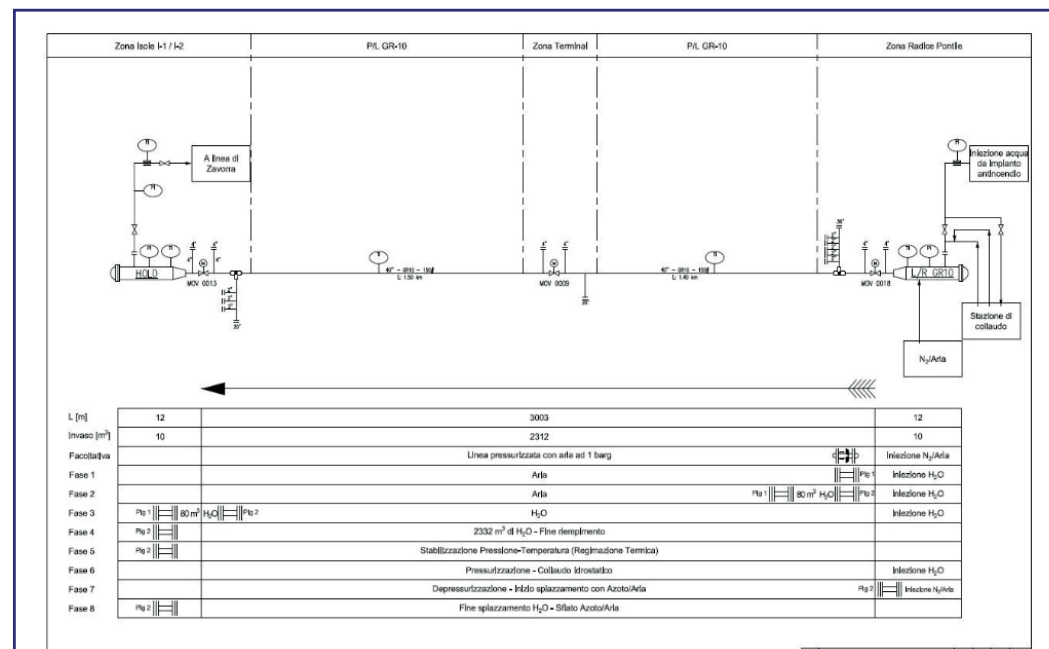
Special Activities

Pre-commissioning & Hydro testing

- **Technical specification including:**

- Hydraulic Test Operation Sequence
- Plant arrangement description
- Process Flow Diagram with instrumentation, connections, facilities and N° of PIGs for each phase

Two solutions proposed: One section vs two sections



Special Activities

Pipeline Cleaning and Inerting – with PIG

Technical specification including:

- **Plant preparation**
- **Operations Sequence**
 - Cleaning fluid
 - Cleaning Target Definition
 - N° of PIG launches
 - Nitrogen Displacement arrangement
- **Operating Parameters**
 - Pressure
 - Flowrate
 - Pig velocity
 - Volume
- **Contingency Evaluation**

