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Comprehensive Approach to the Decommissioning of Oil Pipelines

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CEPS Scope

Pipeline Services

- Hydrostatic Testing
- Mechanical Cleaning and Gauging
- Chemical Cleaning
- Pipeline Drying
- Nitrogen Services

Pipeline Integrity Services

- Pipeline Revalidation and Upgrading
- Defect Assessment
- Testing of Pipeline Component
- Reliability and Lifetime Assessment Studies
- Design, Manufacturing and Installation of Epoxy Filled Reinforcing Sleeves


Existing pipelines are getting older and older

Comprehensive Approach to the Decommissioning of Oil Pipelines

All operators of oil pipelines in the world solve often these problems:

- Remedial repairs of defected pipeline sections
- Decommissioning of oil pipelines
- Abandonment of shut-down oil pipelines

15 Years Experience

CEPS specialists have more than 15 years experience with following services:

- Nitrogen services – oil displacement services and nitrogen purging
- Chemical cleaning and conservation of oil pipelines
- Conversion of pipelines from crude oil to refined oil transportation
- Combination of the above methods

Comprehensive Approach to the Decommissioning of Oil Pipelines

Comprehensive approach = combination of oil displacement and subsequent chemical cleaning of pipelines transporting hydrocarbon (oil) liquids before remedial repairs, conservation, conversion, abandonment or (hydro)testing

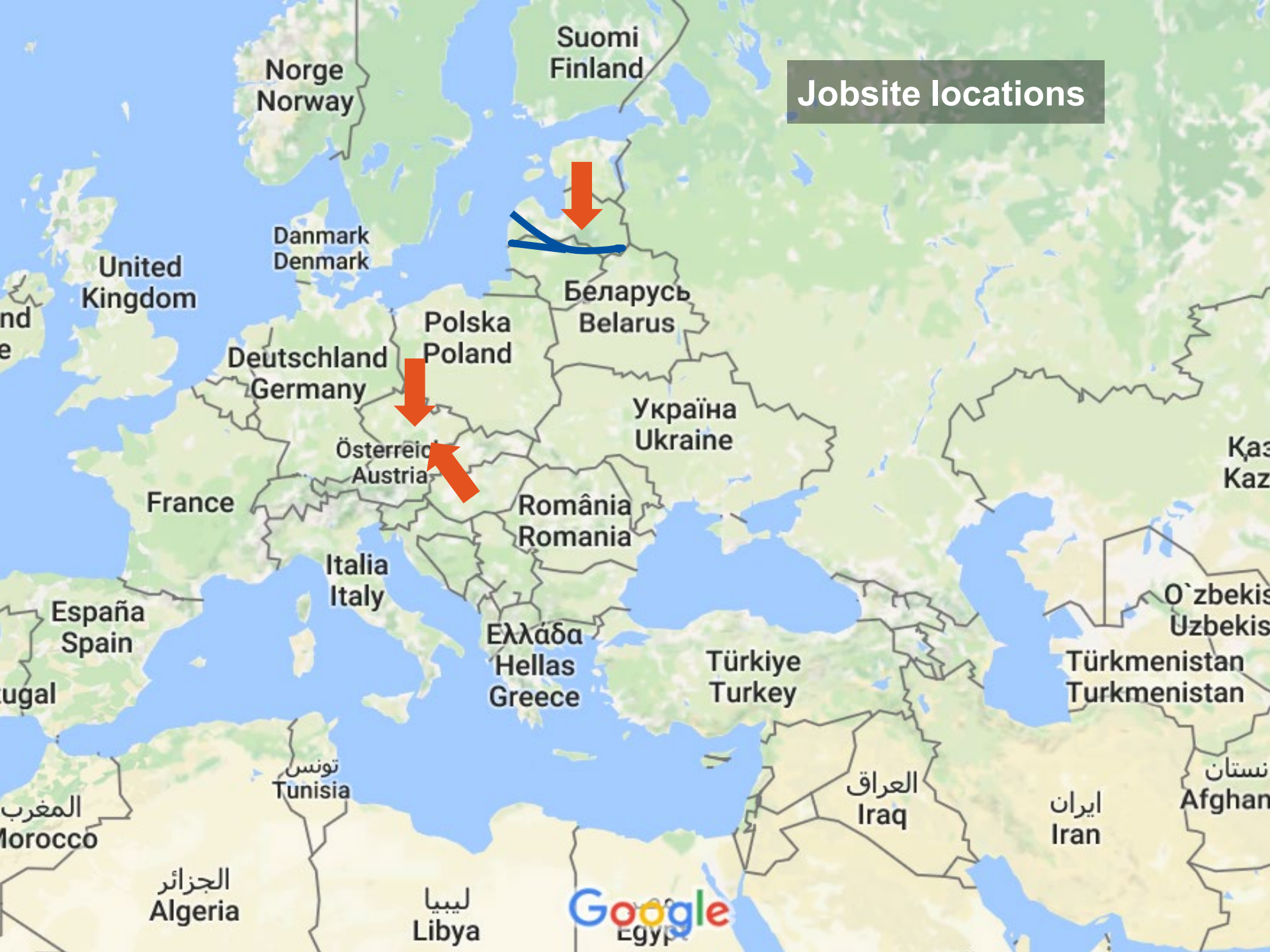
More than 2000 km of 4″ to 28″ oil pipelines have been decommissioned, abandoned, prepared for repair works or converted from crude oil to refined oil product transportation during the last 15 years by CEPS

Comprehensive Approach – Examples of Several Projects

Decommissioning and conservation of 750 km 28″ crude oil pipelines in Latvia and Lithuania after 35 years of operation

Replacement of 32 pipes of 21″ crude oil pipeline in Czech Republic within 96 hours

Comprehensive Approach to the repairs of product pipelines in Czech Republic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Decommissioning of 28″ Crude Oil Pipelines

- Crude oil transport to Baltic states from Russian was terminated 10 years ago
- 1000 km of 28″ pipelines remained full of oil, approx. 2.4 million barrels of oil were blocked for any other use
- Pipeline owners decided to decommission 750 km of 28″ crude oil pipelines

Pipeline routes

Decommissioning of 28″ Crude Oil Pipelines

CEPS Scope of Work

- Engineering study and project
- Oil displacement
- Chemical cleaning
- Pipelines conservation

Decommissioning – Preparation Works

- For emptying and chemical cleaning the pipelines were divided into 11 sections
- Temporary or existing stable launching/receiving pig traps were used

- In advance CEPS designed and manufactured needed launching/receiving temporary traps for emptying and chemical cleaning processes
- Pipeline operators made all excavation and welding work as well as HT&P

Decommissioning – Displacement of Crude Oil

- Two batching pigs were inserted into each launching trap
- Water was pumped into space between the pigs

- Set of 2 pigs and inert water batch was propelled through the pipeline by nitrogen mixture containing more than 90% of nitrogen

Decommissioning – Displacement of Crude Oil

- Nitrogen mixture was produced directly on site by 2 mobile membrane nitrogen CEPS units

- Crude oil was moved to reservoirs in refinery (distance up to 330 km)
- The longest pipeline sections were 180 km, 2 × 150 km and 130 km

Main Goals of Chemical Cleaning

Internal pipeline surface after cleaning

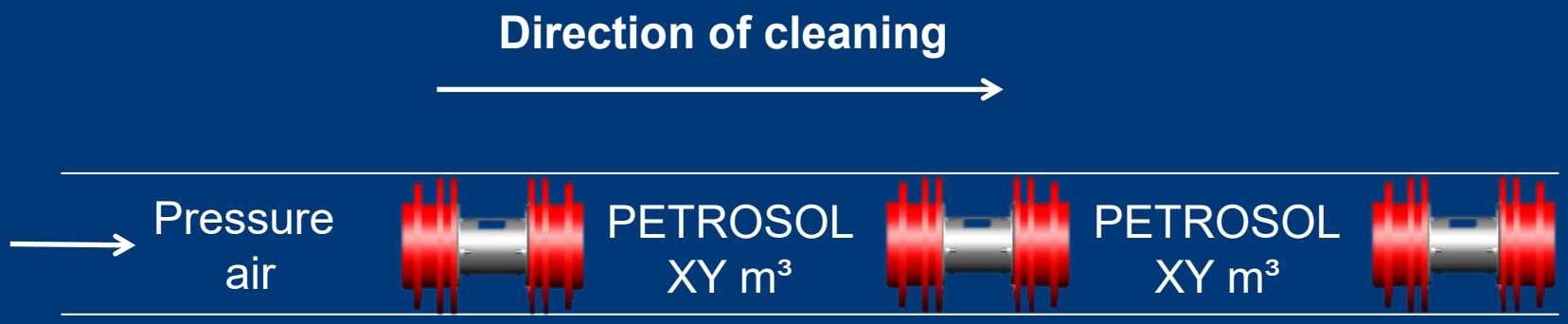
- To clean internal pipeline surface from oil residues so that no environment pollution would occur in case of pipe wall penetration in the future
- To create permanent safety atmosphere for the assembly-welding activities in pipeline

Decommissioning – Chemical Cleaning

- Special temporary CEPS launching/receiving pig traps were fixed/welded to both ends of each cleaning section

- Several cleaning pigs were inserted to each launching trap

Decommissioning – Chemical Cleaning



- Water solutions of PETROSOL cleaning agent in predetermined volumes and concentration were pumped among the pigs in each section
- These cleaning trains were propelled through cleaned pipeline sections with compress air
- The length of the longest cleaned section was 180 km

PETROSOL Cleaning Agent

Preparation of PETROSOL water solution on jobsite

- PETROSOL is an environmentally friendly hydrophilic (water soluble) agent, which very efficiently removes rests of oil from internal pipeline surface
- The manipulation with it is safe with no special HSE requirements
- ADR regulations are not required for its transportation

Internal Pipeline Surface

After propelling the cleaning train through the pipeline, the internal pipeline surface of each sections was completely clean without any trace of oil

Before cleaning

After cleaning

Decommissioning – Pipeline Conservation

- After chemical cleaning the pig traps were flame cut from the pipeline and free ends were blinded by cups
- Thanks to the completely removal of hydrocarbon from the internal pipeline surface all these cutting and welding jobs were carried out in a permanent safety atmosphere

Decommissioning – Pipeline Conservation

Pipeline conservation against a future corrosion protection was made in two steps:

First step – passivation of internal pipeline surface was done already during chemical cleaning. A corrosion inhibitor was added to the last water batch.

Second step – after the chemical cleaning the pipeline was purged by the nitrogen mixture containing more than 95% of nitrogen. The pressure of nitrogen was increased up to 3 bar.

Nitrogen purging on site

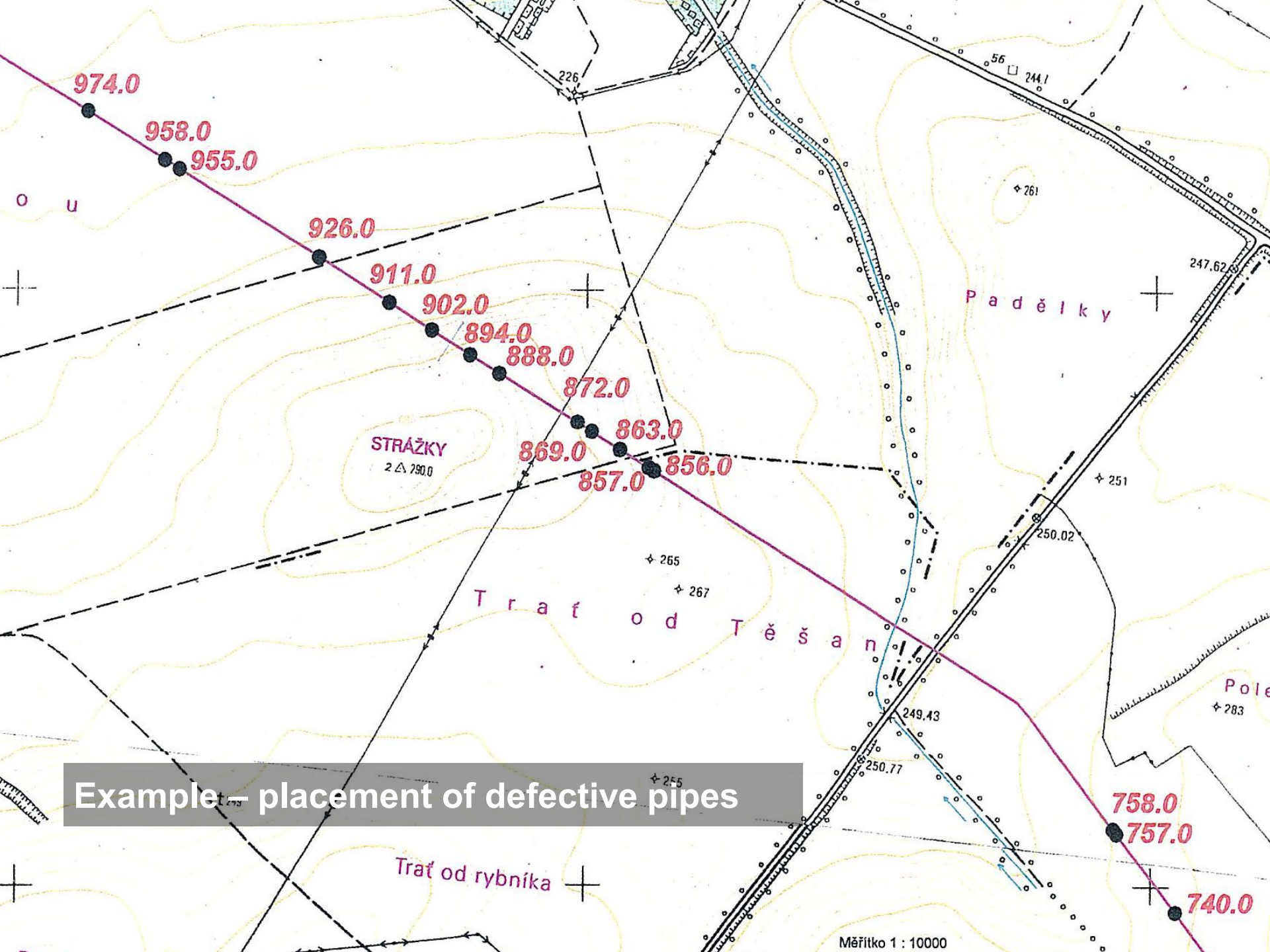
Benefits of the Decommissioning Project

- Permanent elimination of the risk of environment pollution due to oil spill in the event of a breach of pipe wall caused by corrosion or third party
- Creation of permanent safety atmosphere inside the pipeline, which eliminates risk of explosion during welding or damage done by third party
- Reduction of running costs for maintenance
- Readiness of pipeline for re-commissioning and revalidation when the need arises in the future
- Financial benefit from utilization of crude oil from the pipelines

Replacement of 32 Defective Pipes on 10 km 21″ Crude Oil Pipeline Section within 96 hours

Tasks, conditions and solution

- Based on ILI results – 32 defective pipes of 21″ crude oil pipeline had to be cut out and replaced by new ones
- 32 defective 10-meters long pipes were randomly spread on about 10 km length section
- The operator accepted 96 hours of shut-down period only
- CEPS proposed and used combination of oil displacement and subsequent chemical cleaning of that section



Example – placement of defective pipes

Sequence of Operations

Prior to shut-down

- Localization and excavation of all defective pipes
- Preparing 32 jobsites including NDT and delivery of new pipes

During to 96 hours of shut-down

- 1st day – crude oil displacement from the section
- 2nd day – chemical cleaning of the section
- 3rd day – 16 pipes were cut out and replaced by new ones
- 4th day – 16 pipes were cut out and replaced by new ones
- After 88 hours of shut-down the pipeline was ready for operation

Assembly-welding Works

Flame cutting at permanently explosion safe conditions

- Thanks to the completely removal of hydrocarbon from the inside of the pipeline section there was created a permanent safety atmosphere for the assembly-welding activities
- No precautions against explosion (e.g. isolation pigs, gas bags or clay plugs) were necessary to use


Spread of some jobsites

Assembly-welding Works

Welding activities at permanently explosion safe conditions

- 16 assembly-welding groups worked simultaneously
- 5 NDT independent groups/laboratories worked there
- More than 100 workers worked together on jobsites during these days

In this manner the replacement of 32 defective pipes was completed within 88 hours!

Comprehensive Approach to the Repairs of Product Pipelines in Czech Republic

- There are many old 8″ to 12″ product pipelines of the length of 40 to 90 km
- Based on ILI results usually many defects of pipes are determined to be cut out and replace by new ones
- For example: 8″ product pipelines, 90 km, 100 defects are spread in different locations
- Thanks to the comprehensive approach is average shut down time about 15 days
- In case of subsequent hydrostatic testing the shut down time of such a pipeline is about 30 days

Conclusion

Combination of product displacement and subsequent chemical cleaning of pipelines transporting hydrocarbon liquids:

- Is the most effective, quick, safe and environmentally responsible pipeline cleaning solution, that makes many pipeline decommissioning, remedial repair works, revalidation or conversion projects feasible
- Reduces costs, needed shut-down time and significantly enhances safety of works

QUESTIONS?

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