

# Big oil removal and great pipeline cleaning

CEPS a.s.  
Jesenice u Prahy  
Czech Republic



LatRosTrans  
Riga  
Latvia



# Hundred kilometres long part of crude oil pipeline DN 700 Polock – Ventspils on Latvian territory was:

- drained in December 2010,
- chemical cleaned in May 2011,
- filled by nitrogen in June 2011.



# Result of these activities:

- pipeline decommissioning,
- elimination of pollution risk due to oil leakage,
- preparation of pipeline for next possible use in the future.



And why this actually  
happened?

Why were all this activities  
done?





Let's go back to recent  
history



Crude oil pipeline DN 700  
Polock – Ventspils is northern  
part of Drushba pipeline  
system which in the past  
supplied crude oil especially to  
the former Soviet Union and  
central European countries



# Crude oil pipeline DN 700 Polock - Ventspils



But  
9 years ago oil supplies to  
Latvia and Lithuania were  
stopped due to economic and  
political reasons



Approximately million barrels  
of crude oil remained blocked  
in the pipeline



This fact  
did not relieve the operator  
from the obligation and  
responsibility to do regular  
maintenance and to ensure  
pipeline safety, security and  
functionality!!!



For that reason,  
in 2010 the pipeline owner  
decided to decommission this  
pipeline on Latvian territory  
between Lithuanian border  
and Ventspils oil terminal



# Pipeline for decommission





# In early October Czech pipeline servicing company CEPS a.s.

- won a tender
- was awarded a contract



The design and technical preparation was carried out quickly during the following two months



So  
emptying of the first pipeline  
part could begin in late  
November



# 1<sup>st</sup> step of decommissioning:

displacement of crude oil  
from the pipeline



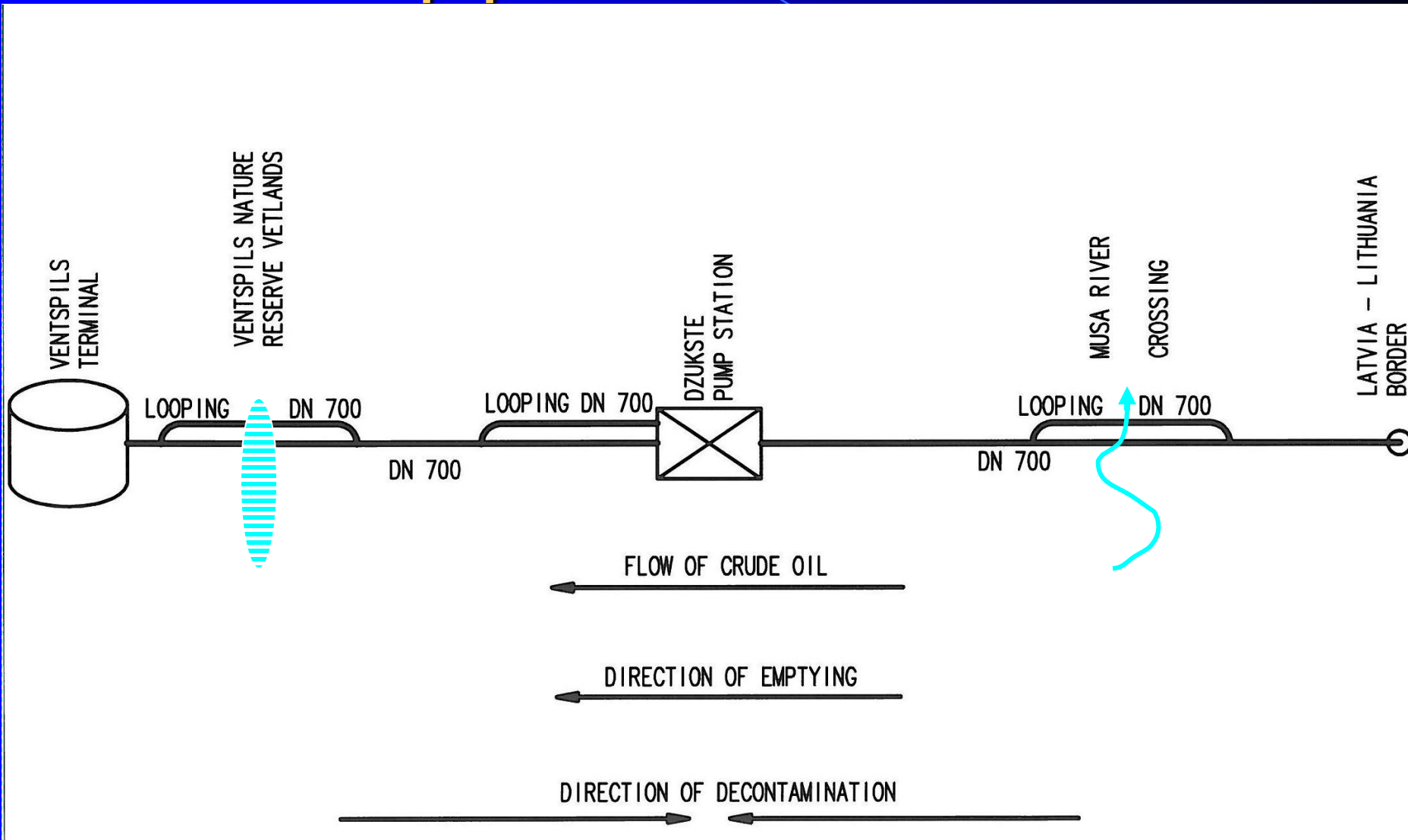
Before  
starting the work  
the pipeline was divided  
into 6 sections  
for technical reasons



There were 3 sections on  
pipeline main line  
and  
3 looping sections:

- Musa river crossing
- Dzukste pump station output
- Ventspils' nature reserve wetlands crossing

# Scheme of decommissioned pipeline DN 700



Operator LatRosTrans  
divided the pipeline using  
line plugging technology  
and performed excavation  
as well as welding and  
assembly work



Then  
temporary special traps  
supplied by CEPS  
were welded at the end  
of each section



# Temporary special trap



Two batching pigs were  
inserted into each launching  
trap  
in advance.

One of the pigs  
was always equipped  
with transmitter.



# Batching pig with transmitter



Then water was pumped into  
the space between the pigs  
and after that  
pigs and water inertization  
batch was pushed steadily  
through the pipeline



Crude oil was displaced this way directly into an existing stable 50,000 cubic meters tank at the oil terminal in Ventspils



Before that, the crude oil from the loopings was pushed through interconnecting pipelines to the main line the same way



# 2<sup>nd</sup> step of decommissioning:

## pipeline decontamination





Decontamination of the emptied pipeline was done by chemical cleaning



The main objective was to achieve clean internal surface of the pipeline so that contamination of soil and underground water would not be possible in case of pipe penetration by corrosion or by some other reason in the future

At the beginning of decontamination, special launching and receiving traps were installed on each end of the section to be cleaned



# Installation of special launching trap





# Special receiving trap





After that  
several pigs were inserted into each  
launching trap



Several different decontamination batches containing water solution of PETROSOL cleaning agent in specified concentrations and volumes were prepared and pushed through the pipeline

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





# Internal surface of pipe after decontamination



Every time the cleaning train arrived to the receiving trap, samples of water were taken from the last water-purging bath to check residual concentration of hydrocarbons in water (VOC)





# Collection of water samples





# Collected water samples



The concentration of VOC  
allowed by local authorities was  
30 mg/l

The concentration in the samples  
measured in accredited  
laboratory never exceed 1mg/l



All decontaminated and water purging batches (total 1850 m<sup>3</sup>) were accumulated in temporary retention reservoirs, which had been built for this purpose by operator in the area inside Dzukste pump station



# Temporary retention reservoirs





Waste water solution  
containing hydrocarbons was  
chemically modified  
and  
hydrocarbon residues were  
partially separated and removed  
from the water



Rest of dissolved hydrocarbon residues were removed using a biological degradation method



# Biological degradation of hydrocarbon residues in temporary reservoirs



After three months of  
treatment  
the cleaned water from  
reservoirs was drained into  
near creek



# After decontamination

- The cleaning traps were cut off.
- The sections were connected or seal off by pressure cups.
- Thanks to the completely removal of hydrocarbons from the inside of the pipe there was created permanent safety atmosphere in pipeline.



After decontamination  
all other assembly-welding  
activities were carried out  
without further necessary  
safety precautions against  
explosion



# Flame cut in permanent safety atmosphere





# 3<sup>rd</sup> step of decommission:

## pipeline conservation



The first stage of conservation was carried out during decontamination

- At the end the cleaning train behind the last water-purging batch, the passivation batch (the water solution of trisodium phosphate - $\text{Na}_3\text{PO}_4$ ) was pumped in.
- This way there was created corrosion resistible environment on the steel surface in pipeline.

## The second stage of conservation was filling pipeline by nitrogen

- The decontamination parts of pipeline was purged by 95% nitrogen.
- Then the pressure of nitrogen was increased up to 3 bar.
- This pressure of nitrogen in pipeline will be maintained in the future.



The nitrogen source was a special mobile unit producing nitrogen by membrane separation of the air.

The entire unit is installed in one 20 feet ISO 1C container adapted for easy operation.



# Mobile nitrogen unit





# Benefits of this decommissioning project

1. 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.



# Other benefits

2. Creation of permanent safety atmosphere inside the pipeline, which eliminates risk of explosion during welding or damage done by third party.
3. Reduction of running costs for maintenance.



# Other benefits

4. Possibility of monitoring the pipeline pressure tightness based on measurement of the nitrogen pressure.
5. Readiness of pipeline for re-commissioning and revalidation when the need arises in the future.

