REMEDIATION OF POLLUTED GROUNDWATER IN THE DANUBE RIVER FLOW IN SERBIA

7th STEERING GROUP MEETING OF PA4 OF THE EUSDR
TO RESTORE AND MAINTAIN THE QUALITY OF WATERS
28th March 2014
Ministry of Foreign Affairs of Hungary
Budapest

REMEDIATION OF POLLUTED GROUNDWATER IN THE DANUBE RIVER FLOW IN SERBIA

DANUBE REGION strategy
Institutional Capacity

Republic of Serbia: Project localities in the vicinity of the cities of Belgrade, Novi Sad and Pančevo

Remediation of Polluted Groundwater in the Novi Sad Oil Refinery and Remediation of Polluted Groundwater in the Pančevo Oil Refinery

НИС
ГАСПРОМ НЕФТ

ВОДЕ ВОЈВОДИНЕ

PROJECT REALIZATION OPPORTUNITIES

EU Strategy for the Danube Region
Technical Assistance Facility for Danube Region Projects

The project is closely connected and related to the Danube river flow

The project is environment protection oriented, with high contribution to restoring and maintaining the quality of waters and soil, as well as managing environmental risks

The project contributes to the EUSDR priority areas of restoring and maintaining the quality of waters and managing environmental risks

EUSDR Action addressed: TO RESTORE AND MAINTAIN THE QUALITY OF WATERS.

Necessity of project adjustment to be able to apply for funding within EU funds and programmes

Possibilities for project preparation and adjustments through external consultancy within the framework of the Technical Assistance Facility for Danube Region Projects

With the aim of widening the project macroregional impact and its replicability potential, possibility of widening the partnership network with other EUSDR countries

REMEDIATION OF POLLUTED GROUNDWATER IN THE NOVI SAD OIL REFINERY

Background

- As consequence of NATO bombing in 1999, groundwater and soil became polluted in the Refinery locality, with an estimated:
- **5600 m^3** of oil and oil products flood;
- App. **8 ha** - contaminated area;
- App. **27400 m^2** area where was detected oily phase;
- App. **2750 m^3 (2400 t)** free oily phase on groundwater surface;
- **31,000 m^3** contaminated soil to be possibly remediated;
- **2 km** from the residential part of the city of Novi Sad in the vicinity of the city water catchment „War island“;
- Conducted research determined that the oily phase is threatening to pollute Danube and the water catchment for **>500.000** inhabitants in Novi Sad.

Objectives

- Physical removal of oily phase from the groundwater surface and remediation of the polluted groundwater and soil;
- Eliminating the possibility of contamination of Danube and water catchment in Novi Sad;
- Minimizing negative impact of contaminated groundwater on environment;
- Fulfilling the obligations resulting from EU Water Framework Directive;
- The project contributes to the **EUSDR** priority areas of restoring and maintaining the quality of waters and managing environmental risks.

CHRONOLOGY OF ENVIRONMENTAL POLLUTION ON RNS SITE

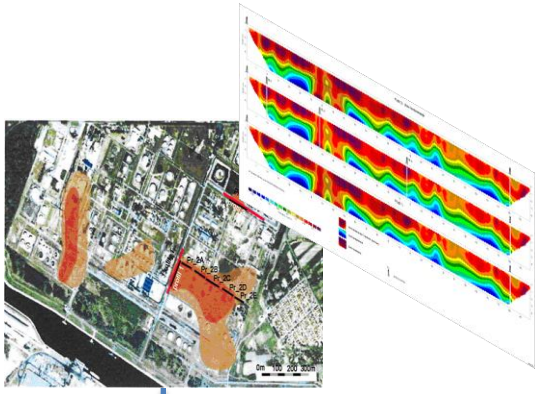
1999.

Pilot project - Extraction of free oil phase (GEOTEST BRNO)

2002.

End of pilot project– bioremediation of soil from the N-8 (DEKONTA)

2007.

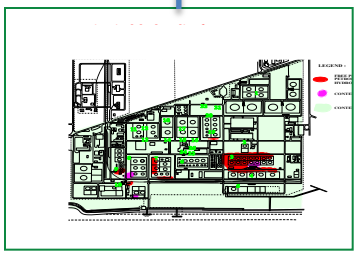


Geoelectrical scanning (NTC)

2011.

2000.

Measuring the level of contamination of soil and groundwater

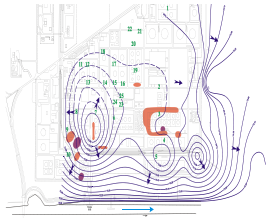


2005

Pilot project - bioremediation of soil from the N-8 (DEKONTA)

2010.

Environmental audit – D'Appolonia

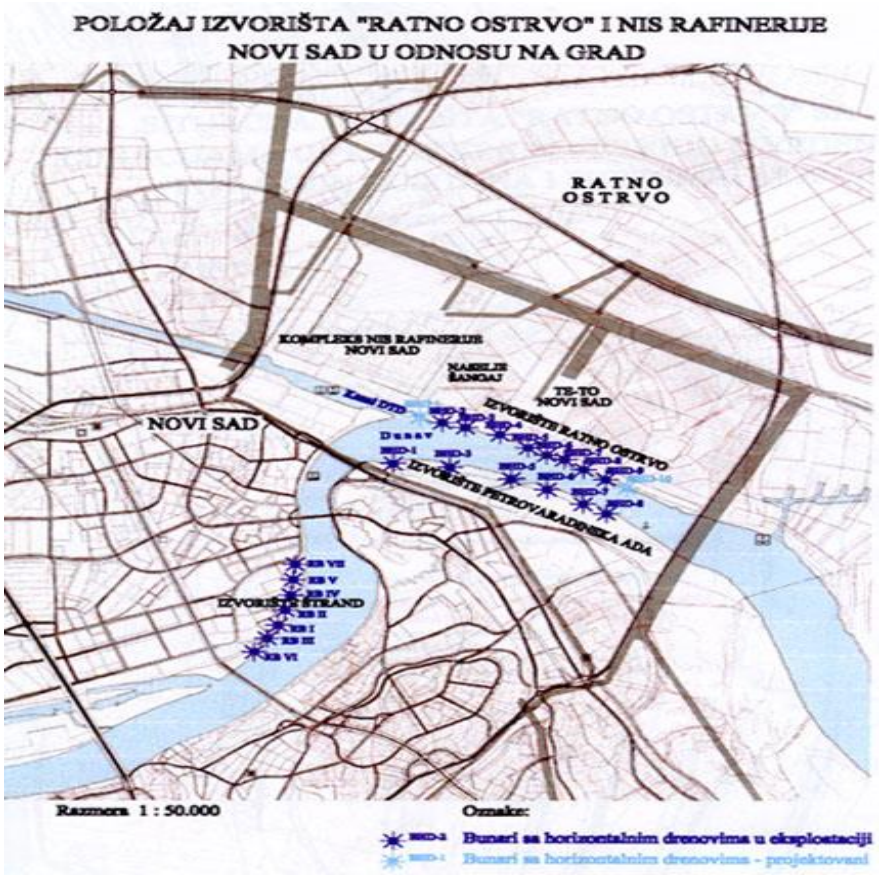


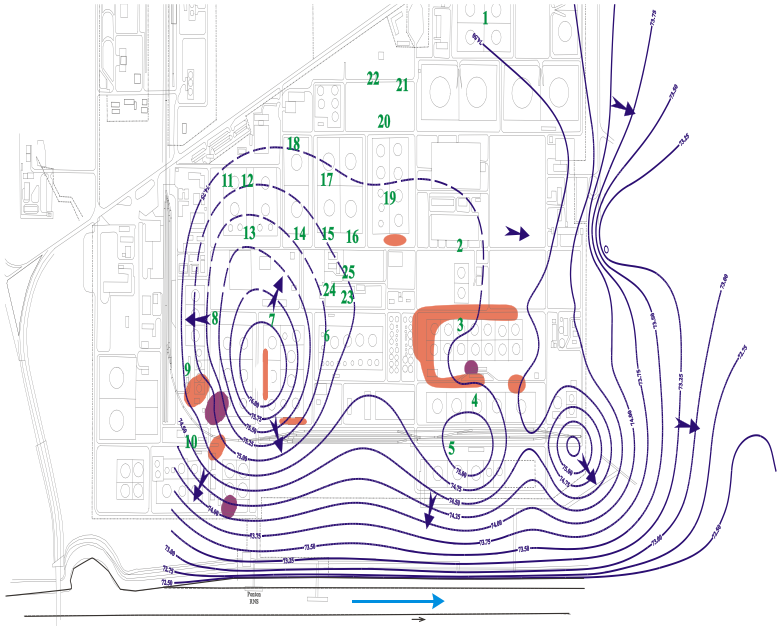
2012.

Started Project of soil remediation N-8 (Modekolo)

ENVIRONMENTAL CONDITIONS

Contaminated groundwater: pollution from the most polluted part of the RNS is moving towards the source of drinking water "War Island" and it is necessary to take measures to prevent contamination of the well.





Previous investigation 2000-2003: In order to determine groundwater contamination (Geotest Brno):

- 95 wells were drilled to monitor groundwater levels and to sample for physical and chemical analysis.
- Drainage channels to prevent pollution of groundwater and protect the source „War insland“ were installed.
- A Geoelectrical resistivity survey in the RNS area was conducted in 2011 by NTC.

REMEDIATION OF POLLUTED GROUNDWATER IN THE PANČEVO OIL REFINERY

Background

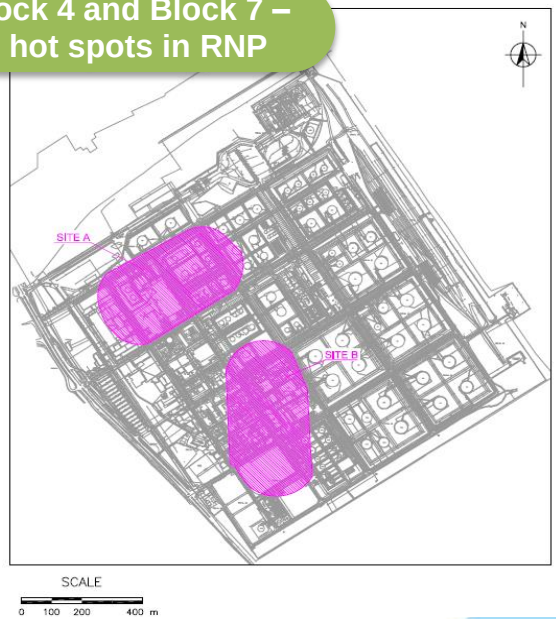
- The biggest refinery in Serbia, located in the vicinity of Pančevo and Belgrade and **1.5 km** from Danube river;
- During the NATO bombing in 1999, storage tanks and pipelines were destroyed causing releases of various pollutants in the environment;
- Crude oil and derivates burned and leaked into soil and sewer system;
- During 2012th, realized pilot project at Dock: 4 shallow wells were drilled (B-2 , B-3, B-4 as extraction, B-1 to return the treated water), and exhausted **207.5 m^3** of oily water.

Objectives

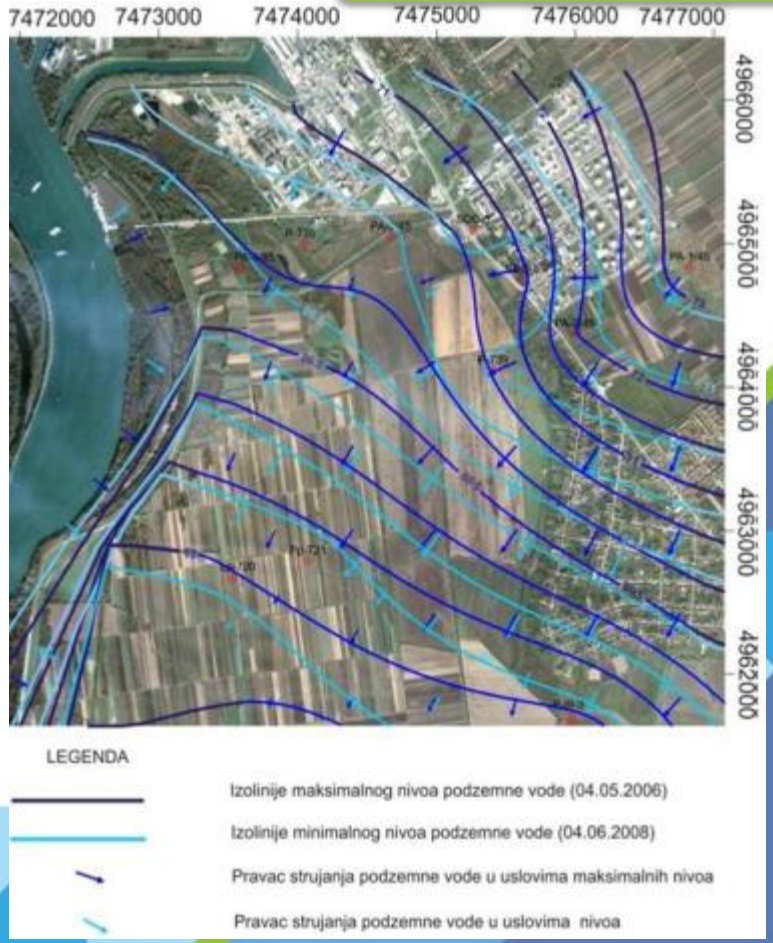
- Physical removal of oily phase from the groundwater surface and remediation of the polluted groundwater;
- Eliminating the possibility of oily water flow of Danube;
- Minimizing negative impact of contaminated groundwater on environment;
- Fulfilling the obligations resulting from EU Water Framework Directive;
- The project contributes to the **EUSDR** priority areas of restoring and maintaining the quality of waters and managing environmental risks.

Pančevo Oil Refinery location

Block 4 and Block 7 – hot spots in RNP



Model of the movement of groundwater (depending on the level of the Danube



ESTIMATED TOTAL COSTS OF THE FUTURE PROJECT

Remediation of Polluted Groundwater in the Novi Sad Oil Refinery and Remediation of Polluted Groundwater in the Pančevo Oil Refinery

Preparation of Terms of Reference – 100 000 EUR

+

Preparation of Feasibility Study – 200 000 EUR

+

Preparation of Groundwater Remediation Project – 400 000 EUR

=

Project documentation - total cost for both location: EUR 700 000

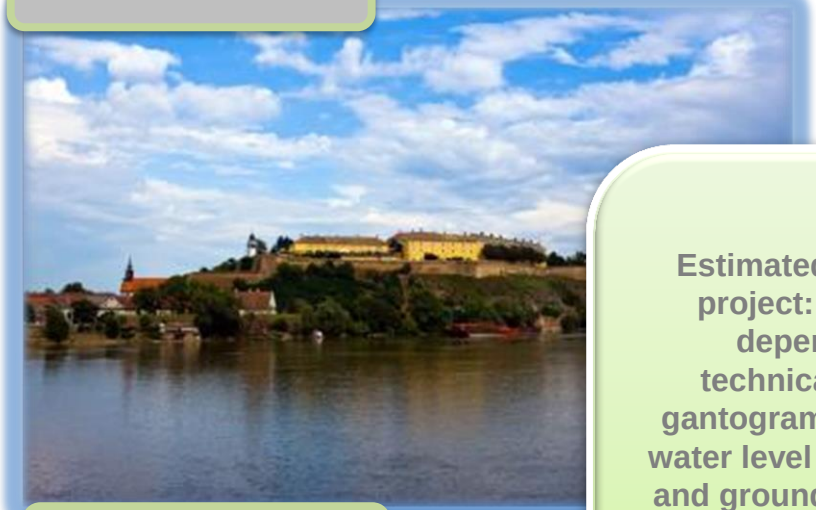
Cost of remediation activities and contamination elimination

?

POTENTIAL PARTNERS

- Public utility „Vode Vojvodine“;
- Faculty of Mining and Geology – Department of Hidrogeology;
- Water Supply and Sewerage System Public Utility Company of Novi Sad;
- Faculty of Sciences, Department of Chemistry, Novi Sad;
- HIP Petrohemija, State Enterprise;
- Azotara Pančevo, State Enterprise;
- City of Novi Sad;
- City of Pančevo;
- Open for widening the partnership network with other EUSDR countries;

Petrovaradin, Novi Sad



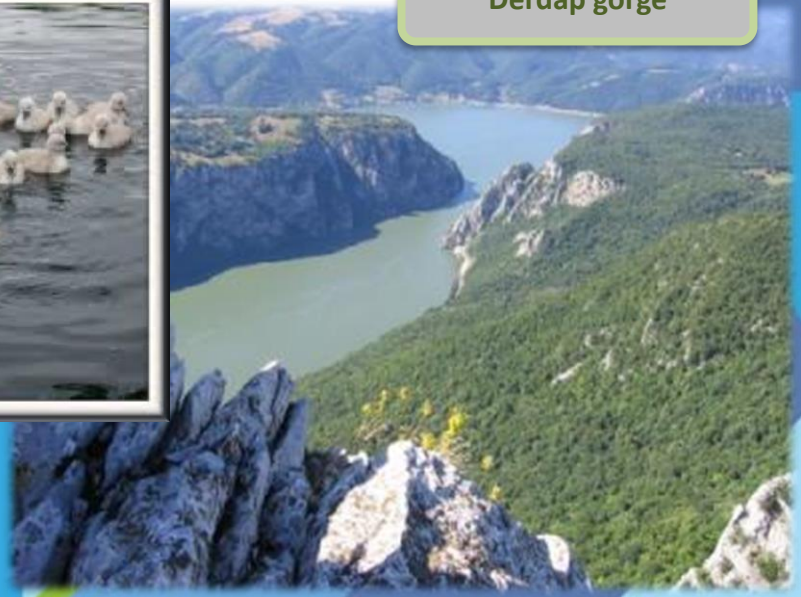
Golubac, G. Milanovac

Estimated duration of project: 2014-2016, depending on technical solution, gantogram of activities, water level of the Danube and ground water levels, equipment capacities, etc.

Kalemegdan, Beograd

Swans near Novi Sad

Đerdap gorge



Cruise on the Danube