Investigation of potentially contaminated industrial sites in Serbia

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Introduction and context

Investigation of potentially contaminated industrial sites is a part of the GEF-funded project "Enhanced Cross-sectoral Land Management through Land Use Pressure Reduction and Planning" which is implemented by United Nations Environment Programme (UN Environment) with the support of the Italian Ministry of Environment, Land and Sea and in close cooperation with the Ministry of Environmental Protection of the Republic of Serbia and Serbian Environmental Protection Agency (SEPA) in the period 2015-2018.

Materials and approaches

32 potentially contaminated industrial sites have been selected from the database managed by SEPA. Data and information on previous land use, type of industry, surface area, type and quantity of hazardous substances at the location and on the surrounding area, soil and groundwater quality, as well as geological, pedological and hydrological features were collected from previous studies and though numerous consultations. In 2017, 264 soil samples were collected and undergone physical-chemical analysis, analysis of heavy metals content and specific pollutants such as: TPHs, PAHs, PCBs, cyanides, pesticides etc. (Figure)

INDUSTRIAL SITE				
Exceeded limit values	Exceeded remediation values			
1. "Factory of synthetic rubber" - Zrenjanin				
Ni	/			
2. "Toza Markovic" - Kikinda				
Cu, Pb, Ni, C10-C40	Zn			
3. "a.d. Radijator" - Zrenjanin				
Cr, Cu, Zn, Ni, C10-C40	PCB			
4. "Papirpak" - Čačak				
As, Cd, Cr, Cu, Ni, Pb, Zn				
5. "Elektronska industrija Niš" - Nis				
Cd, Cu, Ni, C10-C40	Cd, Cu, Ni, C10-C40			
6. "Factory of non-ferro	ous metals" - Prokuplje			
As, Cd, Pb, PCB, PAH	Cr, Cu, Ni, Zn, C10-C40			
7. "Wagon fact	ory" - Kraljevo			
Cd, Cr, Zn, PCB, PAH, C10-C40	As, Cu, Pb, Ni			
8. "Magnohro	m" - Kraljevo			
Cr, Pb, Zn, C10-C40	As, Ni, Cu			
9. "Šumadija Itd" - Kragujevac				
Cd, Pb, PAH, C10-C40	As, Cu, Ni, Zn			
10. "Zastava truck" - Kragujevac				
As, Ni, Pb, Zn PAH, C10-C40	Cu			
11. "RTB Bor" - mining site				
Pb, Zn, Ni, C10-C40	As, Cu			
12. "Leather-textile co	mbine Koza" - Zajecar			
Cu, Ni, C10-C40	As, Pb, Cr			
13. "Prva petoletka" - Trstenik				
Cr, Pb, C10-C40, PAH	As, Cd, Cu, Ni, Zn			
14. "TE Morava (power plant)" - Svilajnac				
As, Cu, Pb, Zn, C10-C40	Ni			



INDUSTRIAL SITE			
Exceeded limit values	Exceeded remediation values		
17. "Hesteel Serbia Iron factory"	– surrounding area - Smederevo		
Cr, Ni, Pb, C10-C40	Cr, Ni, Pb, C10-C40		
18. "TE Kostolc (power plant)" - Pozarevac			
Cr, Cu, Ni, Pb, Zn	Cr, Cu, Ni, Pb, Zn		
19. "Cl Zupa" - Krusevac			
C10-C40, PAH	C10-C40, PAH		
20. "TENT A (power plant)" - Obrenovac			
Cr, Ni	Cr, Ni		
21. "TENT B (power	plant)" - Obrenovac		
Ni, C10-C40	Ni, C10-C40		
22. "RB Kolubara (mining site)" - Lazarevac			
Ni, As	Ni, As		
23. "TE Kolubara (power plant)" - Lazarevac			
Ni, Pb, Zn, As, Cr, C10-C40, Ni	Ni, Pb, Zn, As, Cr, C10-C40, Ni		
24. "Copper	mill" – Uzice		
Cd, C10-C40	Cd, C10-C40		
25. "CI Zorka	a" - Subotica		
Cd, Ni, Pb, Cr, PAH	Cd, Ni, Pb, Cr, PAH		
26. "Paper and packaging factory" – Vladicin Han			
As, Cd, Cr, Cu, Ni, Pb, Zn, C10- C40	As, Cd, Cr, Cu, Ni, Pb, Zn, C10- C40		
27. " Factory of steel panels, r	nachine and steel" - Surdulica		
As, Cu, Ni, Zn, C10-C40, PAH	As, Cu, Ni, Zn, C10-C40, PAH		
28. "PKS La	tex" - Cacak		
As, Cr, Cu, Zn	As, Cr, Cu, Zn		
29. "CI Elixir – old phospho	-gypsum landfil" - Prahovo		
Hg, Cd, Cu, Ni, Zn, C10-C40	Hg, Cd, Cu, Ni, Zn, C10-C40		
30. "CI Visko	za" - Loznica		
Cr, C10-C40	Cr, C10-C40		
31. "Zorka - Non-ferrou	ıs metallurgy" – Sabac		
Cr, PCB, C10-C40	Cr, PCB, C10-C40		
32. "21. oktobar" - Kragujevac			
As, Cd, Pb, C10-C40, cyanide	As, Cd, Pb, C10-C40, cyanide		
complex	complex		

15. "Machine ind	dustry Nis" - Nis	Car industry
Cd, PCB, PAH, C10-C40	As, Cr, Cu, Ni, Pb, Zn	Textile, leather industry
16. "Battery factory" - Sombor		Paper industry
As, Cd, Cu, Ni, Zn, PAH	Pb, C10-C40	Battery industry

Outcomes

The result of the project is the list of prioritized sites for clean-up and remediation. Out of 32, 14 locations need to be remediated according to the gathered information and investigation. For most of the remaining location, detailed investigation of the contamination extent is needed. It is expected that the next step forward will be the development of remediation projects for priority sites.

Transferability

Beside expected future detail investigation of contaminated locations and remediation projects, it is important to develop the National Strategy for Management of Contaminated Sites. Establishment of a legal framework for contaminated sites will be crucial in ensuring a faster and more efficient response to the problems related to the contaminated sites. It is also necessary to strengthen the institutional capacities to enable adequate management.



Republic of Serbia, Ministry of Environmental Protection, Environmental Protection Agency, www.sepa.gov.rs