



Soil pollution on Dutch railway sites

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Contents

- *SBNS organization*
- *Contaminants*
- *Remediation goals and strategy*

Introduction of the SBNS

- *Founded in 1996 after privatization of the Dutch Railways (NS)*
- *Two Ministries, ProRail and NS Vastgoed*
- *Project management organization: 30 employees*
- *Task: to investigate and remediate all historical cases of soil pollution on railway properties*
- *Estimated soil remediation costs 830 million EUR*

Achievements in 2005

- *Annual budget 23 million EUR*
- *50 remediation project: excavations and in situ.*
- *Preliminary soil investigation on 4.050 locations (1.513 hectares).*
- *250 delineating soil investigations*
- *End of 2005: 16% of the 3000 sites have been remediated*

A stepwise approach

Historical desk research

Preliminary soil investigation

Preparing remediation

- *Delineating soil investigation*
- *Remediation research and plan*

Executing remediation

- *Contracting*
- *Insurances & security*
- *Licenses & permits*



Time

Contaminants

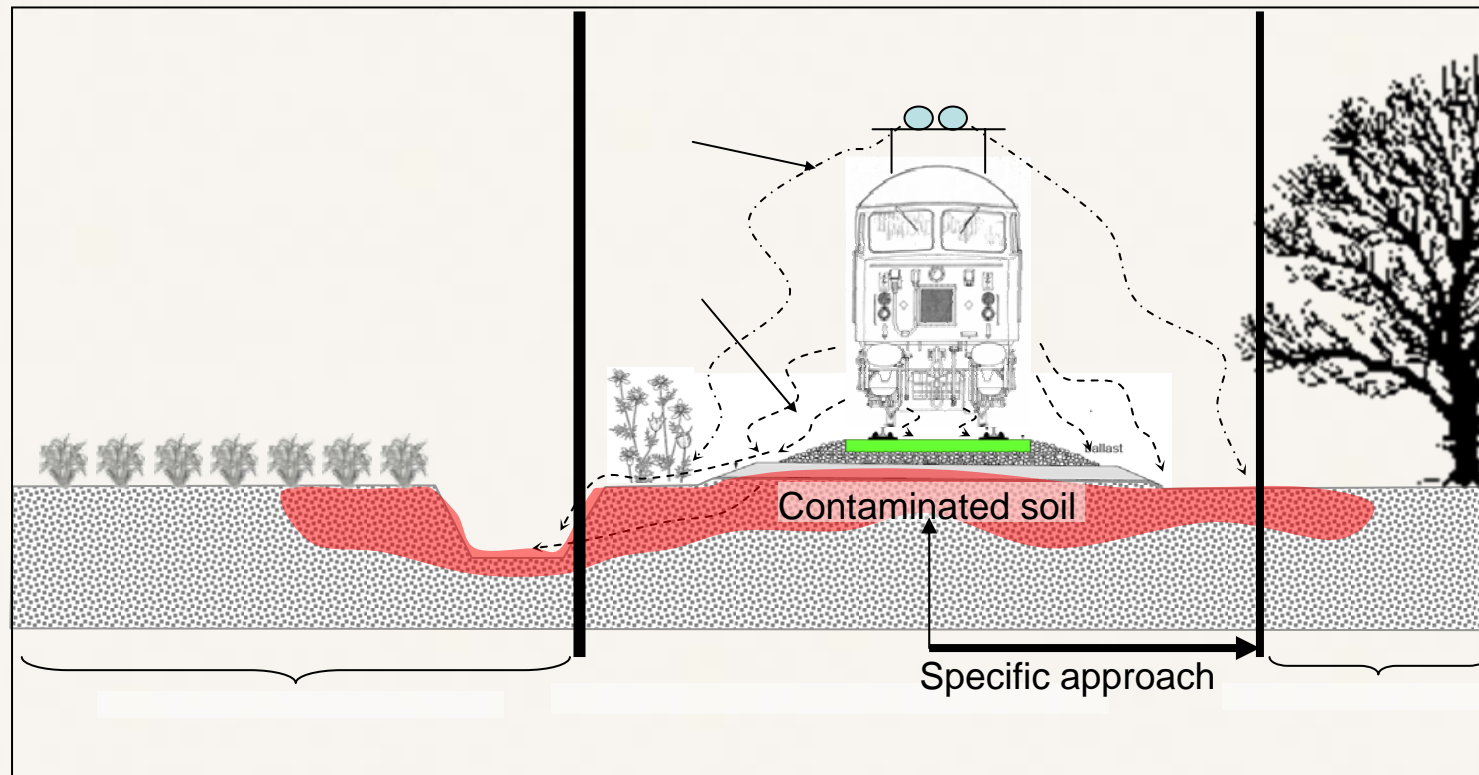
Diffuse contamination:

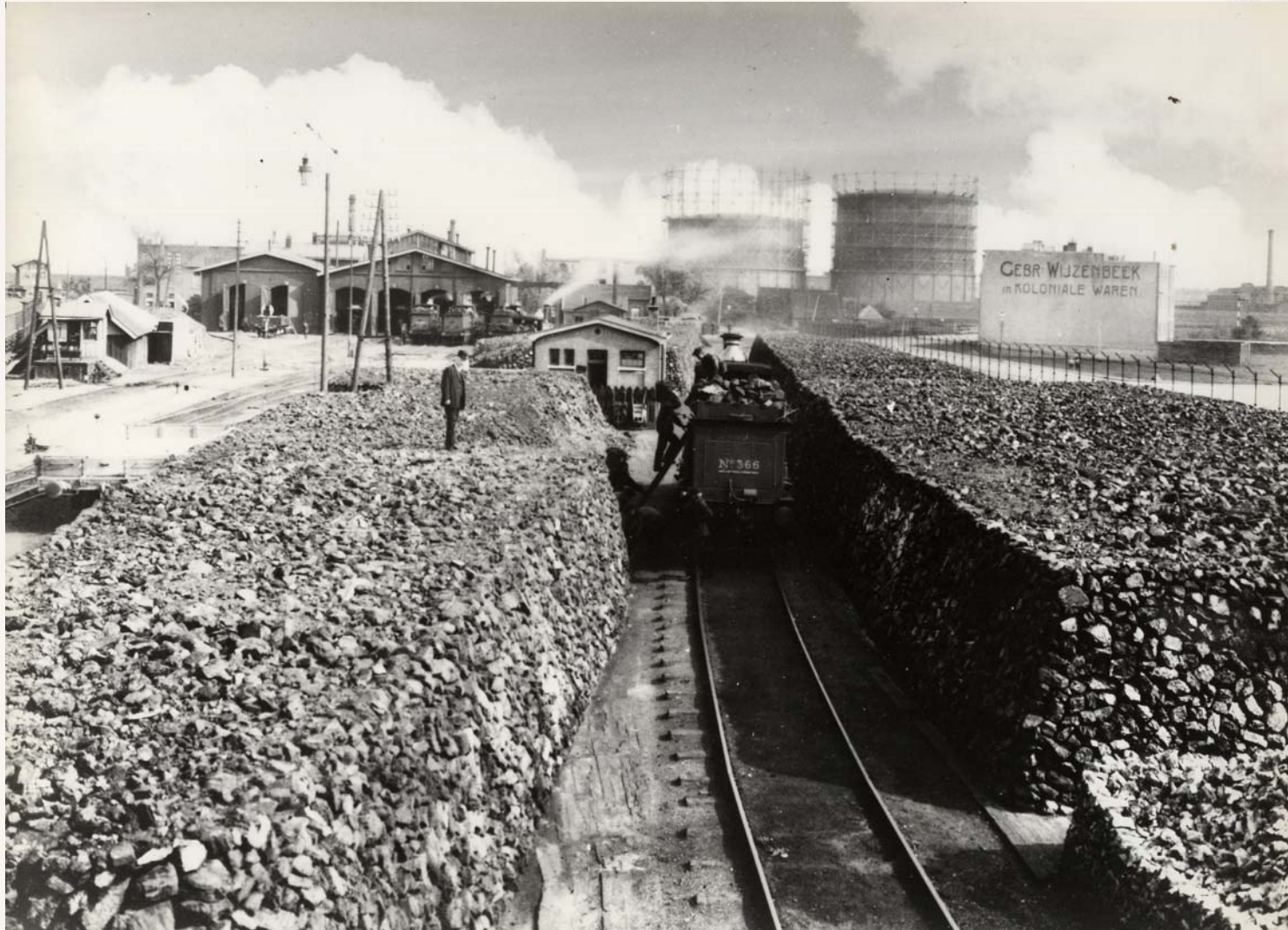
- *Along the track: heavy metals: Cu, Pb, Zn, PAH*
- *All railroad sites: coal and coal ashes: PAH*

Local sources, hot spots

- *Fuel tanks & tank installations and service stations: TPH, BTEX, PAH*
- *Repair & maintenance sites: TPH, BTEX, Chlorinated solvents*
- *Wood preservative plants (creosote)*
- *Gas manufacturing plants: naphthalene, BTEX, TPH.*
- *Railway ditches: heavy metals, TPH, pesticides*
- *Illegal dump sites: TPH, asbestos, ???*

Contamination along the railroad tracks

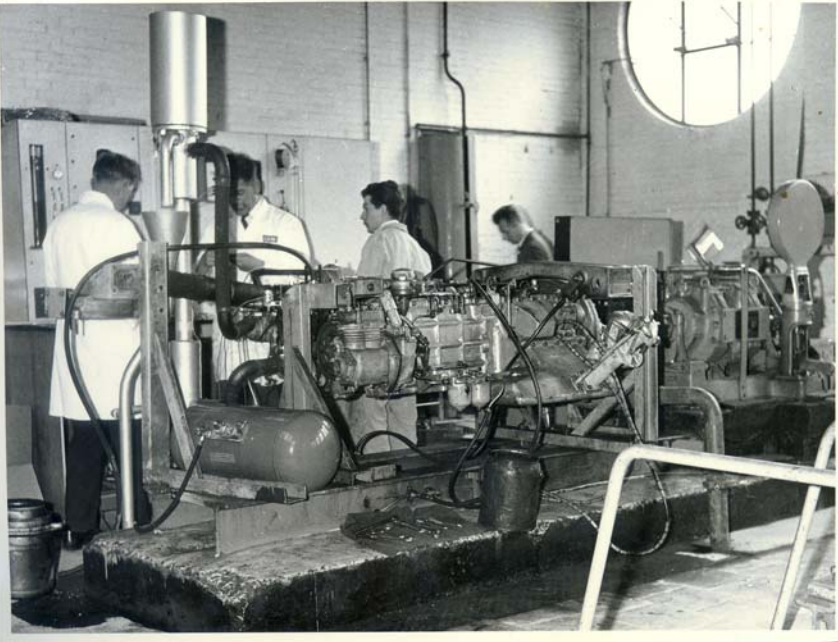




Coal ash: PAH



Repair & Maintenance sites









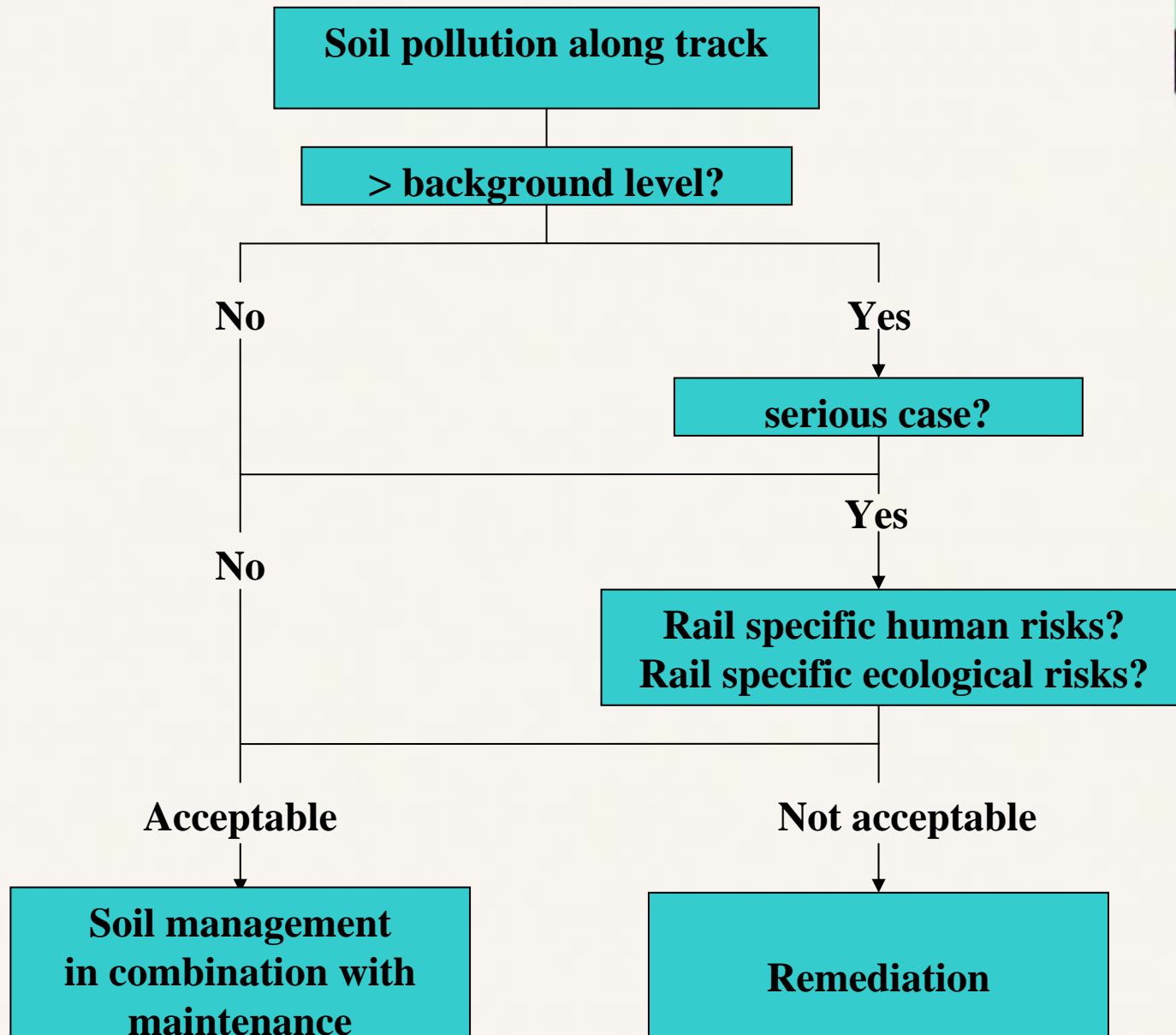
Remediation

- *Top soil (top 1 - 2 m): functional approach (excavation)*
- *Mobile contaminants (>2 m deep): cost effective (excavation, in situ, NA)*
- *Immobile contamination (> 2 m deep): functional (excavation)*

- *More risk-based in the future*

Considerations

- *Current remedial practice on railway-related properties is not cost-effective*
 - *Immobile contaminants hardly cause any ecological or human risk*
 - *Contamination is not easily accessible and remediation causes inconvenience to those using the track*
 - *Recontamination from the ongoing normal use of the track*



Conclusions

- *Immobile contaminants not necessarily need to be removed from railway sites since there are no human and ecological risks*
- *Generic soil quality criteria for railway tracks can lead to more cost effective remedial actions and lower costs for society*
- *Soil management necessary*
- *Railway Soil Network
part of UIC environmental group, towards an European standard?*











