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REMEDIATION OF PAST POLLUTION FROM EX-MILITARY BASES AND INDUSTRIAL ZONES

Feasibility Study
Site Specific Report
Tapa Railway Depot, Shed for railway carriages – JRK no. 44

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Summary

TAPA RAILWAY DEPOT SHED FOR RAILWAY CARRIAGES has been entered into the database of past pollution sites under the serial number 44. The territory of the Tapa Railway depot is an industrial site.

The owner of the Tapa Railway Depot is State company Eesti Raudtee (Estonian Railways). Estonian state purchased Estonian Railways Company back (at the end of year 2006) from private shareholders (BRS) and it's possible that on current site the old Tapa Shed for railway carriages is not more needed. Tapa Railway Depot Shed for railway carriages is still partially working enterprise with unclear future vision. It's proclaimed that rails from tracks will be removed but land and buildings may be sold off or remains unsold.

According to the results of the soil sample analyses and the documented visual assessments, it can be stated that the soil is contaminated over the reference values for an industrial zone with polycyclic aromatic hydrocarbons (PAH) nearby borehole 4418 on area 1000 m^2 (the volume is 500 m^3).

The thin contaminated layer (thickness 0.6m) is located at depth 2.7 m meters from surface. Taking into account relatively small volume of contaminated soil and also that spreading of contaminants with groundwater is relatively limited, its may be rational not provide soil clean-up works before clearness about future of investigated area.

There is no direct risk of spreading remained oil products contamination (from Tapa Railway Depot Shed for railway carriages) further into other groundwater aquifers. Sometimes the free oil phase could be detected on groundwater; it arises with groundwater table from limestone fissures or it spreads with perched temporary groundwater in topsoil after heavy rainfalls and snowmelt.

The groundwater is contaminated with polycyclic aromatic compounds, volatile organic compounds and mineral oil products on area 1.7 ha. At general the contaminated groundwater spreads within the area where the reference values for the residential zone in soil are also exceeded. The free phase of oil products was detected on groundwater in borehole 4422.

It must be taken into account that by drill logs descriptions there are fissures in limestone containing oil products at depth 5-12 m from ground.

Due of oil products existing in fissures, it always possible to hit some contaminated groundwater on Tapa Railway Depot Shed for railway carriages area and on its surroundings. At the present time the Ordovician aquifer groundwater is contaminated with oil products for almost the entire territory of Tapa Town (generally caused by Tapa Military Air Base at Soviet time). The identifying of contamination causer and source at nowadays is problematic on surrounding areas of Tapa Railway Depot Shed for railway carriages.

There is total up to 20 tons of oil residuals and oil products mix with water in the existing tanks. All of the storage containers and piping systems currently not used on the territory of the Tapa Railway Depot will have to be dismantled and removed.

Two new monitoring boreholes have been entered into the State Cadastral Register.

1 Introduction

Tapa Railway Depot Shed for railway carriages was one of the principal maintenance shops for, wagons and carriages on the Estonian Railway network.

Tapa Railway Depot was established at 1876. From year 1920 the Shed for railway carriages operates on investigated area.

From year 1950 from the Engine Shed was separated Shed for railway carriages and the main repairing works building was built at 1956.

Wagons and carriages overhaul and repairing works of that time includes the blacksmith, rolling stock, mechanics, assemblage and painting works.

From year 2005 operating the Shed for railway carriages at investigated area was finished and majority of the wagons and carriages overhaul and repairing works were transferred to Tapa Railway Depot Engine Shed territory. Today the existing buildings are used as industrial materials storehouses and for some painting works of wagons and carriages.

Tapa Railway Depot Shed for railway carriages is still partially working enterprise with unclear future vision. Estonian state purchased Estonian Railways Company back (at the end of year 2006) from private shareholders (BRS) and it's possible that on current site the old Tapa Shed for railway carriages is not more needed. Land and buildings may be sold off or remains unsold.

At the present time the Ordovician aquifer groundwater is contaminated with oil products for almost entire territory of Tapa Town (generally caused by Tapa Military Air Base at Soviet time) and the identifying of water contamination causer and source at nowadays is problematic on surrounding areas of Tapa Railway Depot Shed for railway carriages.

2 Description of the area

Tapa Railway Depot Shed for railway carriages area is situated in the north-western part of the Tapa Town, northwardly from Tapa Railway Yard.

2.1 Land ownership and borders of the cadastral unit

The territory of the Tapa Railway Depot Shed for railway carriages is situated on land cadastral unit Tapa Railway Yard (cadastral no 79101:017:0006), land belongs to Estonian State.

Figure 2-1 Borders of land cadastral units (red lines) at nearby Tapa Railway Depot Shed for railway carriages

2.2 Nearby settlement

Tapa Railway Depot Shed for railway carriages area is situated in the north-western part of the Tapa Town, northwardly from Tapa Railway Yard.
The neighbours are in north the private households and unused land of Tapa Town (residential zone by Regulation No 12 of 02 April 2004) and small industrial areas (industrial zone by Regulation No 12 of 02 April 2004). At west, south and east is situated Tapa Railway Yard area (industrial zone by Regulation No 12 of 02 April 2004).
Nearest living houses are located 30 m north from territory of Tapa Railway Depot Shed for railway carriages.

2.3 Present activities at the site

Today on the investigated territory buildings are used as industrial materials storehouses and for some painting works of wagons and carriages.

2.4 Prognosis for the future

Tapa Railway Depot Shed for railway carriages is still partially working enterprise with unclear future vision. Estonian state purchased Estonian Railways Company back (at the end of year 2006) from private shareholders (BRS) and it's possible that on current site the old Tapa Shed for railway carriages is not more needed. It's proclaimed that rails from tracks will be removed but land and buildings may be sold off or remains unsold.

2.5 Description of previous production technology

Tapa Railway Depot Shed for railway carriages was one of the principal maintenance shops for, wagons and carriages on the Estonian Railway network.

Wagons and carriages maintenance and repairing works of that time includes the blacksmith, rolling stock, mechanics, assemblage and painting works. There was also black oil storages and boilerhouse for needs of Tapa Railway Depot Shed for railway carriages and flotation installations for separating of oily water (repairing required washing of oily parts of carriages and wagons). Wastewater from flotation installation was discharged into Tapa Town sewerage system. There was also stormwater collecting system on area but it was out of order from beginning of 1990-ies. Up to 1980 was used underground black oil storage (*Annex 5. Photo 1*).

There is a not known and documented accident which may cause soil and water pollution, probably the possible pollution sources were out of order underground installations. At year 2001 were detected oil contamination nearby underground tank (50 tons) and from tank were removed 15 m^3 of oil shale oil and from surroundings 25 m^3 of contaminated soil.

From year 2005 operating of the Shed for railway carriages at investigated area was finished and majority of wagons and carriages overhaul and repairing works were transferred to Tapa Railway Depot Engine Shed territory.

Today on the investigated territory buildings are used as industrial materials storehouses and for some painting works of wagons and carriages.

Tapa Railway Depot Shed for railway carriages is still partially working enterprise with unclear future vision. Estonian state purchased Estonian Railways Company back from private shareholders (BRS) and it's possible that on current site the old Tapa Shed for railway carriages is not more needed. Land and buildings may be sold off or remains unsold.
There have been no other companies, dealing with hazardous substances, in the territory of Shed for railway carriages.

2.6 Former investigations and findings

1. Groundwater pollution investigations of Tapa Town. Estonian Geological Survey, 1982.
2. Investigations of potential pollution sources at Pandivere Water Protection Area. AS Maves, 1996;
3. Estonian Railways. Tapa Station. Rehabilitation and renewal project. Factual report on ground investigations. GIB Ltd, 1997;
4. Groundwater remediation works in Tapa military airfield. AS Maves 1997;
5. Assessment of environment state at Estonian Railways AS Maves, 2000;
6. Tapa Railway Yard Reconstruction. Phare Framework Contract - Transport FC351, Environmental Impact Assessment, (Cowi, BCEOM + AS Maves), 2000;

There were not water and soil samples taken from Tapa Railway Depot Shed for railway carriages territory, at general the previous reports deal with current site as potential contamination source.
By the earlier investigations there were highlighted two areas which could be appointed as oil contamination sources:

1. 2 unused over ground vertical tanks (2x180 tons) and one 60 ton tank in old pumping house cellar *(see Annex 5. Photo 2-4)*.
2. Old unused boilerhouse with underground ferroconcrete tank (50 tons) and oily water flotation installations *(see Annex 5. Photo 1 and Photo 5)*.

In abovementioned tanks were stored black oil and oil shale oil.

2.7 Topographical and climatic conditions

The Tapa Railway depot is situated on the limestone plateau of North-Estonia, in the northern side of the Pandivere upland. The absolute heights of the ground remain between 96.5 and 98.3 m, the relief lowers in the western direction towards Rauakõrve Brook.

The climatic conditions are typical for the inland area of Estonia, the average annual temperature is 4.2º C, the coldest month of the year is February (-7º C). Long-term minimum average air temperature of the month is -10º C; maximum average air temperature is 21.6º C. Daily average air temperature exceeds zero degree in the beginning of April. Absolute maximum and minimum air temperatures measured at Tapa are correspondingly 33º C (in July) and -38º C (in January).

Total amount of precipitation of the year is 710 mm, 65-70 % of the total precipitation of the year falls during the warm period of the year (smallest precipitation in February-March, biggest in August). On average, the permanent cover of snow starts in the second decade of December and lasts an approximate of 110 days, the average thickness of the snow is 30 cm. The prevailing winds blow from south-west.

2.8 Characterization of the surface water bodies

The nearest body of surface water is the Valgejõgi River (code 107920), situated 1.1 km north-east. The Rauakõrve Brook (code 107950) is situated 2 km west from investigated area. Due thin topsoil there is no network of drainage ditches discharging stormwater into surface water bodies.

2.9 Geological and hydrogeological conditions

The studied Tapa Railway Depot Shed for railway carriages is located on the outcrop area of upper Ordovician Vormsi (O_3vr) stage limestone bedrock. Total thickness of limestone complex is 130 - 135 m. The absolute elevation of limestone surface is between 94-97 m. The limestone of Vormsi stage contains also some layers of marl or clayey interlayer lenses.

Topsoil, covering the bedrock limestone is relatively thin, up to 3.3 m, mostly 1 - 2 m. The upper part of the quaternary cover is formed mostly from filling with the thickness between 0.4...2.8 m or soil (thickness 0.2 m). As filling is used mainly earth-mixed sand, gravel, splinters, moraine, limestone slabs and construction waste. Under the filling or soil is spread clayey silt or clayey silt moraine. The clayey silt is yellowish-brown and firm, thickness of layer is 0.2-0.4m. The clayey silt moraine (total thickness 0.2-2.3m) is yellowish-grey, firm and containing 35...50% of coarse grained material, the lower part of layer transfers to local moraine consisting mainly of limestone slabs. Moraine is missing at some areas where the lying depth of the limestone is small (borehole 4401). The locations of the boreholes and geological profile are shown in Annex 1. Figure 44-3, the geological cross section is presented in Annex 2.

Groundwater exists in three separate aquifers: Ordovician (limestones), Ordovician-Cambrian (sandstones) and Cambrian-Vendian (sandstones).

After rainfall and snowmelt in the Quaternary deposits (and fill) temporarily existing perched groundwater forms with water in the Ordovician limestone the uppermost groundwater aquifer.
Permanent soil water aquifer is not forming in topsoil sediments due to the small thickness.

The approximate hydraulic conductivity of the soils:

- filling: depending on composition 1 m/day up to 10 m/day (sandy filling),
- silty moraine: 0.1 m/day.
- clayey silt 0.05 m/day
- local moraine consisting mainly of limestone slabs 2 m/d

The Ordovician aquifer consists of Vormsi and Lasmamäe stages limestone and dolomites with clayey interlayer lenses. The hydraulic conductivity of limestone depend presence of fissures and may vary within big limits. The average hydraulic conductivity of Vormsi stage limestone's in the area is 4 m/day (1 m/day in vertical direction). Groundwater in the fissure systems of the carbonate bedrock flows

relatively fast and according to the drilling data the limestone has some fissured zones but there were no large cracks or fissures. The water level was 9.9-10.7 m below ground level at an absolute height of 86.75-86.97 m (28.07.2006). This level of groundwater shall be considered minimum water level since the investigations were carried out at the end of a dry period.

Ordovician aquifer groundwater is recharged by percolation of rain and snowmelt water through the unsaturated topsoil. The area uppermost groundwater is drained by the Rauakõrve Brook. The aquifer is unprotected from pollution from the ground level.

The groundwater flow depends of groundwater table and during current investigations due minimum levels there was not detected reliable flow to some direction.
According to the collected data the groundwater of this aquifer is used by some of private wells at Tapa Town. Nearest private households borewells are situated ca 300 m east and south. These shallow wells are not registered in State Cadastral Register because in Soviet time there was not permanent requirement to register wells with depth less than 20 m (sometime this requirement was, sometime not). *At the present time the Ordovician aquifer groundwater is contaminated with oil products for almost the entire territory of Tapa Town (caused by Tapa Military Air Base at Soviet time) and thus is not potable as drinking water*.

Lower-Cambrian Volhovi, Latorpi, Varangu and Pakerordi stages clayey shale and clay form the Ordovician aquitard (thickness 6 m) separating the Ordovician aquifer and the Ordovician–Cambrian aquifer

The Ordovician–Cambrian aquifer underlies the Ordovician aquitard (at depth ca 140m from ground), the water bearing portion consists of fine-grained sandstone and siltstone of the Lower-Ordovician Pakerort Stage and the Lower-Cambrian Pirita Regional Stage. The thickness of the aquifer is 20-25 m. The hydraulic conductivity is 2-4 m/day and the aquifer transmissivity is in the range 40-100 m²/day. The main recharge area is the Pandivere Upland. Ordovician–Cambrian aquifer groundwater is used in Tapa Town on large areas, also in closeness to Railway Depot Shed for railway carriages. The aquifer is relatively well protected from pollution from the ground level. By calculations there is no direct danger of the spreading of the contaminated groundwater from Tapa Railway Depot Shed for railway carriages area into the existing water supply wells taking water from Ordovician-Cambrian aquifer. The nearest working well (cadastral no 4104) is about 200 m east from the investigated area. The water level in the Ordovician–Cambrian aquifer is ca 32 m below the ground surface at an absolute height of 56 m.

Lower-Cambrian Lontova stage clay ("blue clay") forms the Lükati-Lontova regional aquitard (thickness 60 m) separating the Ordovician–Cambrian aquifer and Cambrian-Vendian aquifer.

Cambrian Vendian aquifer underlies Lükati-Lontova regional aquitard (at depth ca 215 m from ground). The water bearing are sand- and siltstones with interlayer's of clay. The hydraulic conductivity is typically 5 m/day, the aquifer transmissivity is ca 300 m²/day and the specific capacity of wells 0.3-1.0 l/sec/m drawdown. Cambrian-Vendian aquifer groundwater is not used today in Tapa Town for water supply. The potentiometric waterlevel at Tapa is at absolute height ca -2 m. The aquifer is protected from pollution from the ground. The nearest nonworking water supply well is situated about 1.2 km south from Railway Depot.
By calculations there is no any danger of the spreading of the contaminated groundwater into the Cambrian-Vendian aquifer system.

3 Existing facilities

3.1 Present storage conditions of the pollutants

Tapa Railway Depot Shed for railway carriages is still partially working enterprise with unclear future vision. At general the all upgrading, and/or demolition and new installation of tanks and pipelines are left to state owned company Eesti Raudtee (Estonian Railways).

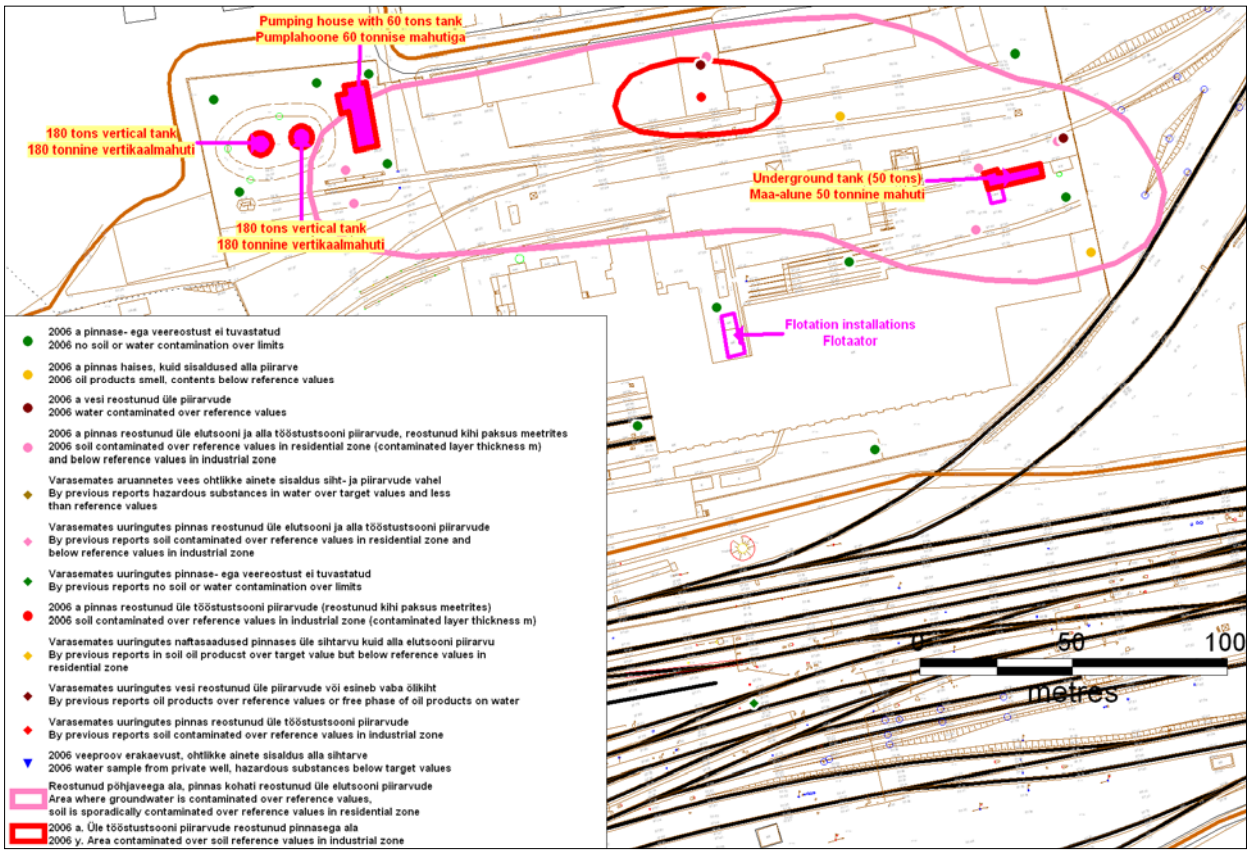


Figure 3-1 Unused tanks and facilities

As the past pollution objects it's reasonable and could be demolished:

- 2 unused over ground vertical tanks (2x180 tons) and one 60 tons tank in cellar with old pumping house *(Annex 5. Photo 2-4)*. All usable oil from these tanks is removed, but they may contain approximately up to 10 tons of old black oil and shale oil residuals.
- underground ferroconcrete tank (50 tons) *(see Annex 5. Photo 1)*, containing up to 10 m^3 of black oil residuals and oily water. This is non waterproof tank and at year 2001 all usable oil from this tank was removed at once.

3.2 Technical condition of existing treatment facilities

The existing sewerage piping system is connected to the Tapa Town sewerage system. There is still a flotation installations *(see Annex 5. Photo 5)* for separating of oily water (repairing required washing of oily parts) collected from technological units of Shed for railway carriages. Wastewater from flotation installation was discharged into Tapa Town sewerage system.

Old stormwater collecting system on area is out of order from beginning of 1990-ies. This old today unknown stormwater system was also connected to the Tapa Town stormwater runoff system. There is no network of drainage ditches discharging water into surface water bodies due thin topsoil.

3.3 Conditions of other facilities in the area

There are no other enterprises on the territory of the Tapa Railway Depot Shed for railway carriages. Tapa Railway Depot Shed for railway carriages is still partially working enterprise with unclear future vision.

4 Extent of the fieldworks

4.1 Sampling methodology

Soil and water samples have been taken according to the methods described in Part I of the report. At total 22 boreholes were established for the research of soil and groundwater (Annex 1 and Annex 3).

4.2 Analysed parameters

Components of hazardous substances, detected in the samples, correspond to the list given in a table in Part I of the report.

4.3 Soil sampling

Soil samples were taken from 13 boreholes (total 16 samples analysed). The maximum depth of samples was 3.3 m (Annex 3 and Annex 4).

4.4 Groundwater and surface water sampling

The groundwater samples were taken (Ordovician aquifer) from the boreholes 4421 and 4422, and from private borewell at Valgejõe street 4 and dug well at Põllu street 13 *(Annex 1. Figure 44-2)*.

5 Identification of pollution

5.1 Amounts and types of pollutants

Volatile organic compounds, polycyclic aromatic compounds, heavy metals and mineral oil products were detected in the groundwater samples, these hazardous substances are some, described in Part I of the report. The results of the analyses are shown in Table 5.1.1 and in Annex 4.

In Table 5.1.1 the contents of hazardous substances exceeding the target value in groundwater is written in bold italics and the contents exceeding the reference value in bold and the cell is highlighted blue. The detected compounds are to a higher or lesser degree toxic and carcinogenic.

The groundwater in the Ordovician aquifer is polluted with polycyclic aromatic compounds, volatile organic compounds and mineral oil products.

The total content of polycyclic aromatic compounds in water sample from borehole 4422 was 118µg/l (exceeds the reference value in the groundwater by 12 times). Highest were the content of chrysene 30 µg/l (the reference values is 1 µg/l) and benzo(a)pyrene 7 µg/l (the reference values is 0.1 µg/l).
The content of benzene in water sample from borehole 4421 was 9 µg/l (the reference value is 5 µg/l).

In borehole 4422 the content of mineral oil products was 39456 µg/l and free oil phase was detected on groundwater.

The content of heavy metals in groundwater remained below the reference values (in borehole 4422 over the target values were detected cadmium, lead, arsenic, and zinc).

Table 5.1.1 Contents of hazardous substances found in water being over the reference precision limits (28.07.2006)

Dangerous substances	Maximum limits in groundwater		Water sampling points, date and depths (m)			
			4421	4422	Private well at Valgejõe street 4	Private well at Põllu street 13
	Target value	Reference value	28.07.06	28.07.06	28.07.06	28.07.06
			10,7-13,0	9,9-12,4		
	µg/l	µg/l	µg/l			
Volatile Organic Compounds	-	-				
Benzene	0.2	5	***9***			
Toluene	0.5	50	***12***	***6***		
Xylene	0.5	30	***2***	***22***		
Ethylbenzene	0.5	50		***6***		
Isopropylbenzene	-	-		8		
Propylbenzene	-	-		2		
1,3,5-trimethylbenzene	-	-		2		
tert-butylbenzene	-	-		3		
1,2,4-trimethylbenzene	-	-		4		
sec-butylbenzene	-	-		4		
p-isopropylbenzene	-	-		18		
Butylbenzene	-	-		7		
Extractive compounds	-	-				
Aliphatics >C10-C12	-	-		660		
Aliphatics >C12-C16	-	-	30	5900		
Aliphatics >C16-C35	-	-	350	77000		
Aromatics >C10-C35	-	-		311000		
Polycyclic aromatic hydrocarbons (PAH)	0.2	10	***4.38***	**118**		
Anthracene	0.1	5	***0.38***	**9**		
Phenanthrene	0.05	2	***0.84***	**16**		
Pyrene	1	5	***1.55***	***5***		

Table 5.1.1 Contents of hazardous substances found in water being over the reference precision limits (28.07.2006)

Dangerous substances	Maximum limits in groundwater		Water sampling points, date and depths (m)			
			4421	4422	Private well at Valgejõe street 4	Private well at Põllu street 13
	Target value	Reference value	28.07.06	28.07.06	28.07.06	28.07.06
			10,7-13,0	9,9-12,4		
	µg/l	µg/l	µg/l			
Acenaphthene	1	30		***7***		
Chrysene	0.01	1	***0.37***	**30**		
Naphthalene	1	50		***4***		
a-methylnaphtalene	1	30		***5***		
b-methylnaphtalene	1	30		1		
Acenaphtalene	-	-	0.13	1		
Benzo(a)pyrene	0.01	1	***0.1***	**7**		
Benzo(a)anthracene	-	-	0.21	9		
Benzo(b,k)fluorantene	-	-	0.15	4		
Indeno(1,2,3,c,d)pyrene	-	-		1		
Dibenzo(a,h)anthracene	-	-		1		
9H-Fluorene	-	-	0.11	10		
Fluoranthene	-	-	0.54	7		
Benzo(g,h,i)perylene	-	-		1		
Dibenzofuran	-	-		1		
Carbazole (Diphenylenimine)	-	-		5		
Heavy metals and other inorganic compounds	-	-				
Cadmium (Cd)	1	10		***1.6***	0.062	0.048
Lead (Pb)	10	200		***130***		
Strontium (Sr)	-	-	230	250	160	210
Arsenic (As)	5	100	0.35	***5.3***	0.21	0.26
Copper (Cu)	15	1000		5.5	3.8	2.6

Table 5.1.1 Contents of hazardous substances found in water being over the reference precision limits (28.07.2006)

Dangerous substances	Maximum limits in groundwater		Water sampling points, date and depths (m)			
			4421	4422	Private well at Valgejõe street 4	Private well at Põllu street 13
	Target value	Reference value	28.07.06	28.07.06	28.07.06	28.07.06
			10,7-13,0	9,9-12,4		
	µg/l	µg/l	µg/l			
Chromium (Cr)	10	200		1.1		
Nickel (Ni)	10	200	0.86	6.2	1	
Zinc (Zn)	50	5000	10	***260***	***130***	14
Aromatic hydrocarbons	1	100	***23***	***82***		
Oil products total	20	600	***380***	**394560**		

In Table 5.1.1 the contents of hazardous substances exceeding the target values of the water is written in bold italics and the contents exceeding the reference values in bold and highlighted blue. The detected compounds are more or less toxic and carcinogenic.

Volatile organic compounds (including BTEX-s), mineral oil products, polycyclic aromatic hydrocarbons (PAH) and heavy metals were detected in the soil samples, these hazardous substances are some, described in Part I of the report. The detected compounds are to a higher or lesser degree toxic and carcinogenic. The test results are shown in Table 5.1.2-5.1.3 and in Annex 4. In Tables 5.1.2 and 5.1.3 the contents of hazardous substances exceeding the reference values of the industrial zone are shown in bold and the cell is highlighted brown; the contents of hazardous substances exceeding the reference values of a residential zone are shown in bold italics.

According to the results of the laboratory analyses, the soil is contaminated only in the borehole 4418, where the content of polycyclic aromatic hydrocarbons (PAH) exceeds the reference values of an industrial zone (highest was the content of methylnaphthalenes).
Over the reference values in residential zone were detected polycyclic aromatic hydrocarbons in borehole 4402, lead in borehole 4407 and total oil products in boreholes 4402, 4418 and 4420.

Table 5.1.2 Contents of hazardous substances found in soil being over the detection limits (24.-25.07.2006)

Dangerous substances	Maximum limits in soil, mg/kg			Soil sampling points and depths (m)							
				4402	4403	4405	4406	4407	4409	4409	4410
	Target value	Reference value in residential zone	Reference value in industrial zone	1,4-1,6	1,2-1,3	0,8-1,0	0,8-1,0	0,6-0,7	0,45-0,55	1,4-1,7	0,4-0,5
	mg/kg			mg/kg							
Volatile Organic Compounds											
Toluene	0.1	3	100	0.007			0.008				
1,3,5-trimethylbenzene	-	-	-	0.018							
1,2,4-trimethylbenzene	-	-	-	0.01							
Extractive compounds	-	-	-								
Aliphatics >C10-C12	-	-	-	21							
Aliphatics >C12-C16	-	-	-	52							
Aliphatics >C16-C35	-	-	-	290							
Aromatics >C8-C10	-	-	-								
Aromatics >C10-C35	-	-	-	170							
Polycyclic aromatic hydrocarbons (PAH)	5	20	200	***141***		4.81		2.12			
Anthracene	1	5	50	4.6							
Phenanthrene	1	5	50	***18***		0.26		0.18			
Pyrene	1	5	50	***6.7***		0.57		0.31			
Acenaphthene	1	4	40	***5.4***		0.1					
Chrysene	0.5	2	20	***2.5***		0.6		0.23			
Naphthalene	1	5	100	***15***							
a-methylnaphtalene	1	4	40	***27***							
b-methylnaphtalene	1	4	40	***29***							
Acenaphtalene	-	-	-	12							
Benzo(a)pyrene	0.1	1	10	***1.5***		0.41		0.16			

Table 5.1.2 Contents of hazardous substances found in soil being over the detection limits (24.-25.07.2006)

Dangerous substances	Maximum limits in soil, mg/kg			Soil sampling points and depths (m)							
				4402	4403	4405	4406	4407	4409	4409	4410
	Target value	Reference value in residential zone	Reference value in industrial zone	1,4-1,6	1,2-1,3	0,8-1,0	0,8-1,0	0,6-0,7	0,45-0,55	1,4-1,7	0,4-0,5
	mg/kg			mg/kg							
Benzo(a)anthracene	-	-	-	2.8		0.52		0.18			
Benzo(b,k)fluorantene	-	-	-	1.4		0.83		0.35			
Indeno(1,2,3,c,d)pyrene	-	-	-	0.51		0.37		0.18			
Dibenzo(a,h)anthracene	-	-	-	0.25		0.12					
9H-Fluorene	-	-	-	11							
Fluoranthene	-	-	-	2.7		0.75		0.39			
Benzo(g,h,i)perylene	-	-	-	0.63		0.28		0.14			
Dibenzofuran	-	-	-	0.35							
Heavy metals and other inorganic compounds											
Cadmium (Cd)	1	5	20	1.3	0.22	0.74	0.33				0.22
Lead (Pb)	50	300	600	8.3	22	9.1	11	***420***	22	7	20
Strontium (Sr)	-	-	-	280	30	260	340	110	160	160	20
Arsenic (As)	20	30	50	2.1	3.7	3.4	3.4	3.7			3.3
Copper (Cu)	100	150	500	2.5	9.1	3.4	4.3	19	8.9	3.9	7.3
Chromium (Cr)	100	300	800	7.5	36	13	14	16	14	12	21
Nickel (Ni)	50	150	500	4.3	21	8.2	8.2	15	13	7.5	13
Zinc (Zn)	200	500	1500	200	140	240	120	90	37	43	87
Aromatic hydrocarbons	1	10	100	0.035			0.008				
Oil products total	100	500	5000	***533***							

Table 5.1.3 Contents of hazardous substances found in soil being over the detection limits (24.-25.07.2006)

Dangerous substances	Maximum limits in soil, mg/kg			Soil sampling points and depths (m)							
				4412	4413	4415	4417	4417	4418	4418	4420
	Target value	Reference value in residential zone	Reference value in industrial zone	0,9-1,0	1,3-1,4	0,5-0,6	0,7-0,8	1,5-1,6	1,5-1,6	3,2-3,3	3,0-3,2
	mg/kg			mg/kg							
Volatile Organic Compounds	-	-	-	-	-	-	-	-	-	-	-
Toluene	0.1	3	100								
Xylene	0.1	5	30							0.21	
Ethylbenzene	0.1	5	50							7.8	
Isopropylbenzene	-	-	-							0.6	0.023
Propylbenzene	-	-	-							0.089	0.041
1,3,5-trimethylbenzene	-	-	-							0.1	
1,2,4-trimethylbenzene	-	-	-							0.34	
sec-butylbenzene	-	-	-							0.29	0.086
p-isopropylbenzene	-	-	-							0.06	
Extractive compounds	-	-	-	-	-	-	-	-	-	-	-
Aliphatics >C10-C12	-	-	-							14	19
Aliphatics >C12-C16	-	-	-							88	130
Aliphatics >C16-C35	-	-	-		310			140	20	790	700
Aromatics >C8-C10	-	-	-							15	
Aromatics >C10-C35	-	-	-							280	
Polycyclic aromatic hydrocarbons (PAH)	5	20	200		0.24				2.41	**239.4**	3.74
Anthracene	1	5	50							2.7	
Phenanthrene	1	5	50							***22***	0.19
Pyrene	1	5	50		0.11				0.27	***5.3***	0.28

Table 5.1.3 Contents of hazardous substances found in soil being over the detection limits (24.-25.07.2006)

Dangerous substances	Maximum limits in soil, mg/kg			Soil sampling points and depths (m)							
				4412	4413	4415	4417	4417	4418	4418	4420
	Target value	Reference value in residential zone	Reference value in industrial zone	0,9-1,0	1,3-1,4	0,5-0,6	0,7-0,8	1,5-1,6	1,5-1,6	3,2-3,3	3,0-3,2
	mg/kg			mg/kg							
Acenaphthene	1	4	40							***5.2***	
Chrysene	0.5	2	20						0.36	2	0.3
Naphthalene	1	5	100							***67***	2.7
a-methylnaphtalene	1	4	40							**47**	
b-methylnaphtalene	1	4	40							**65**	
Acenaphtalene	-	-	-							5.4	
Benzo(a)pyrene	0.1	1	10						0.27	0.72	
Benzo(a)anthracene	-	-	-						0.28	1.5	
Benzo(b,k)fluorantene	-	-	-		0.13				0.6	0.72	
Indeno(1,2,3,c,d)pyrene	-	-	-						0.18	0.22	
Dibenzo(a,h)anthracene	-	-	-							0.14	
9H-Fluorene	-	-	-							12	0.27
Fluoranthene	-	-	-						0.27	2.2	
Benzo(g,h,i)perylene	-	-	-						0.18	0.29	
Dibenzofuran	-	-	-							0.5	
Heavy metals and other inorganic compounds	-	-	-	-	-	-	-	-	-	-	-
Cadmium (Cd)	1	5	20	1.3	1.7	0.53	0.3	0.69	0.36		
Lead (Pb)	50	300	600	42	13	15	35	9.1	56	26	5.3
Strontium (Sr)	-	-	-	51	340	15	33	240	210	490	280
Arsenic (As)	20	30	50	4.8		4			4.1		
Copper (Cu)	100	150	500	13	5.8	5.3	12	4.7	14	7.2	3

Table 5.1.3 Contents of hazardous substances found in soil being over the detection limits (24.-25.07.2006)

Dangerous substances	Maximum limits in soil, mg/kg			Soil sampling points and depths (m)							
				4412	4413	4415	4417	4417	4418	4418	4420
	Target value	Reference value in residential zone	Reference value in industrial zone	0,9-1,0	1,3-1,4	0,5-0,6	0,7-0,8	1,5-1,6	1,5-1,6	3,2-3,3	3,0-3,2
	mg/kg			mg/kg							
Chromium (Cr)	100	300	800	23	5.6	20	16	11	13	3.8	4.2
Nickel (Ni)	50	150	500	16	2.7	11	10	7	7.9	1.2	1.3
Zinc (Zn)	200	500	1500	470	190	140	160	210	120	37	15
Aromatic hydrocarbons	1	10	100							9.489	0.15
Oil products total	100	500	5000		310			140	20	***1187***	***849***

5.2 Soil pollution

The status of the Tapa Railway Depot Shed for railway carriages territory is an industrial zone. The reference values, set for an industrial zone, are shown in Annex 4 (Minister of the Environment Regulation No 12 of 02 April 2004). According to the results of the soil sample analyses and the documented visual assessments, it can be stated that the soil is contaminated over the reference values for an industrial zone with polycyclic aromatic hydrocarbons (PAH) nearby borehole 4418 on area 1000 m^2 (the volume is 500 m^3). The following table 5.2.1 shows in detail the course of calculating the surface areas and cubic contents of the contaminated soil and soil to be removed if contaminated soil will be displaced.

The soil contamination on Tapa Railway Depot Shed for railway carriages territory (industrial zone) depends from groundwater. Often the free oil could be detected on groundwater; it arises with groundwater table from limestone fissures or it could spread with perched temporary groundwater in topsoil after heavy rainfalls and snowmelt.

Table 5.2.1 Calculation of the volume of the contaminated soil exceeding the reference values

	Area m^2	The contaminated layer estimated		The sum cubic content of the contaminated and uncontaminated soils if they removed	
		average thickness m	cubic content m^3	average thickness m	cubic content m^3
Contaminated over the reference values for an industrial zone	1000	0.5	500	2.0	2000

5.3 Water pollution

The groundwater is contaminated with polycyclic aromatic compounds, volatile organic compounds and mineral oil products on area 1.7 ha. An assessment of contamination situation shows that the spreading of contaminants with groundwater is relatively limited, both horizontally and vertically.

At general the contaminated groundwater spreads within the same area where the reference values for the residential zone in soil are exceeded. Sometimes the free oil could be detected on groundwater; it arises with groundwater table from limestone fissures or it could be connected to perched temporary groundwater in topsoil. The free phase of oil products was detected on groundwater in borehole 4422.

It must be taken into account that by drill logs descriptions there are fissures in limestone containing oil products at depth 5-12 m from ground.

At the present time the Ordovician aquifer groundwater is contaminated with oil products on almost entire territory of Tapa Town (generally caused by Tapa Military Air Base at Soviet time) and the identifying of contamination causer and source at nowadays is problematic on surrounding areas. As in old jet fuel there are more common the volatile organic compounds, the Tapa Military Air Base groundwater pollution could be one cause of groundwater pollution at investigated territory.

After the contaminated soil clean-up works, the groundwater contamination will be decreased, but due of oil products existing in fissures it always possible to hit some contaminated groundwater on Tapa Railway Depot Shed for railway carriages area and on its surroundings.

5.4 Description of the existing monitoring network

The existing network comprises of two monitoring wells – 4421 and 4422.
In detail the monitoring wells descriptions are presented in delivery acts of established monitoring wells in Annex 3.

Monitoring well 4421 is located on the northern area of Tapa Railway Depot Shed for railway carriages territory. The monitoring well opens the uppermost groundwater aquifer. The well part which works as a filter is in depth 3.5-13.0 meters from the ground. The monitoring well is secured with a metal casing, which is closed with a metal cap, which can also be locked. The groundwater level (28.07.2006) was at a depth of 10.7 m, at an absolute height of 86.75 m.

Monitoring well 4422 is located on the eastern area of Tapa Railway Depot Shed for railway carriages territory. The monitoring well opens the uppermost groundwater aquifer. The well part which works as a filter is in depth 3.5-13.0 meters from the ground. The monitoring well has been secured with a metal casing, which is closed with a metal cap, which can also be locked. The groundwater level (28.07.2006) was at a depth of 9.9 m, on an absolute height of 86.97 m.

6 Conclusion, simplified risk assessment

6.1 Risks for environment

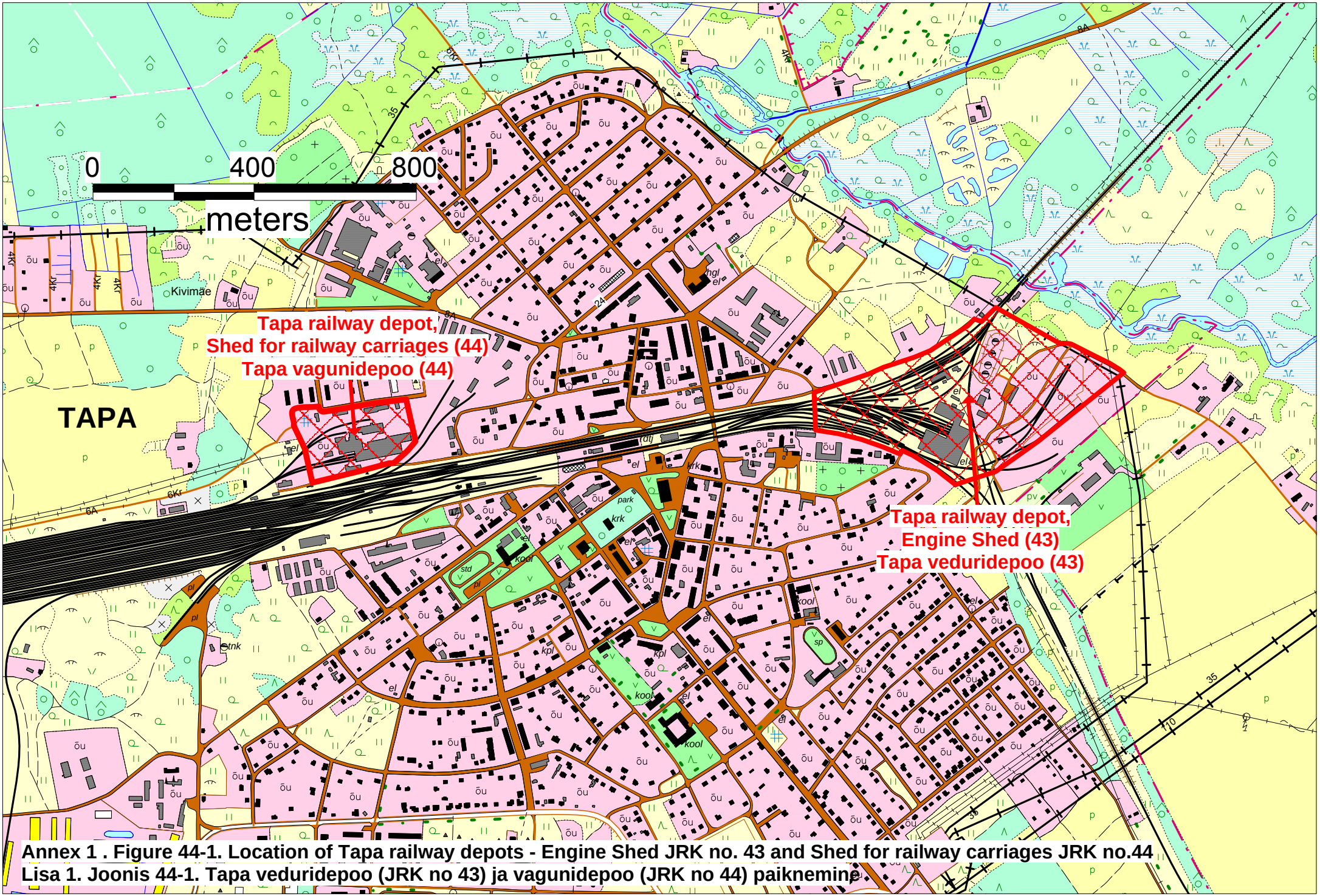
At Tapa Railway Depot Shed for railway carriages the soil and groundwater are contaminated generally with oil products. The soil pollution is local and does not spread over the borders of Tapa Railway Depot Shed for railway carriages territory. There is no direct risk of spreading remained oil products contamination (from Tapa Railway Depot Shed for railway carriages) further into other groundwater aquifers.

There is still risk of fire when the oil products move with groundwater or perched temporary groundwater into the unused underground storages.

6.2 Risks for residents

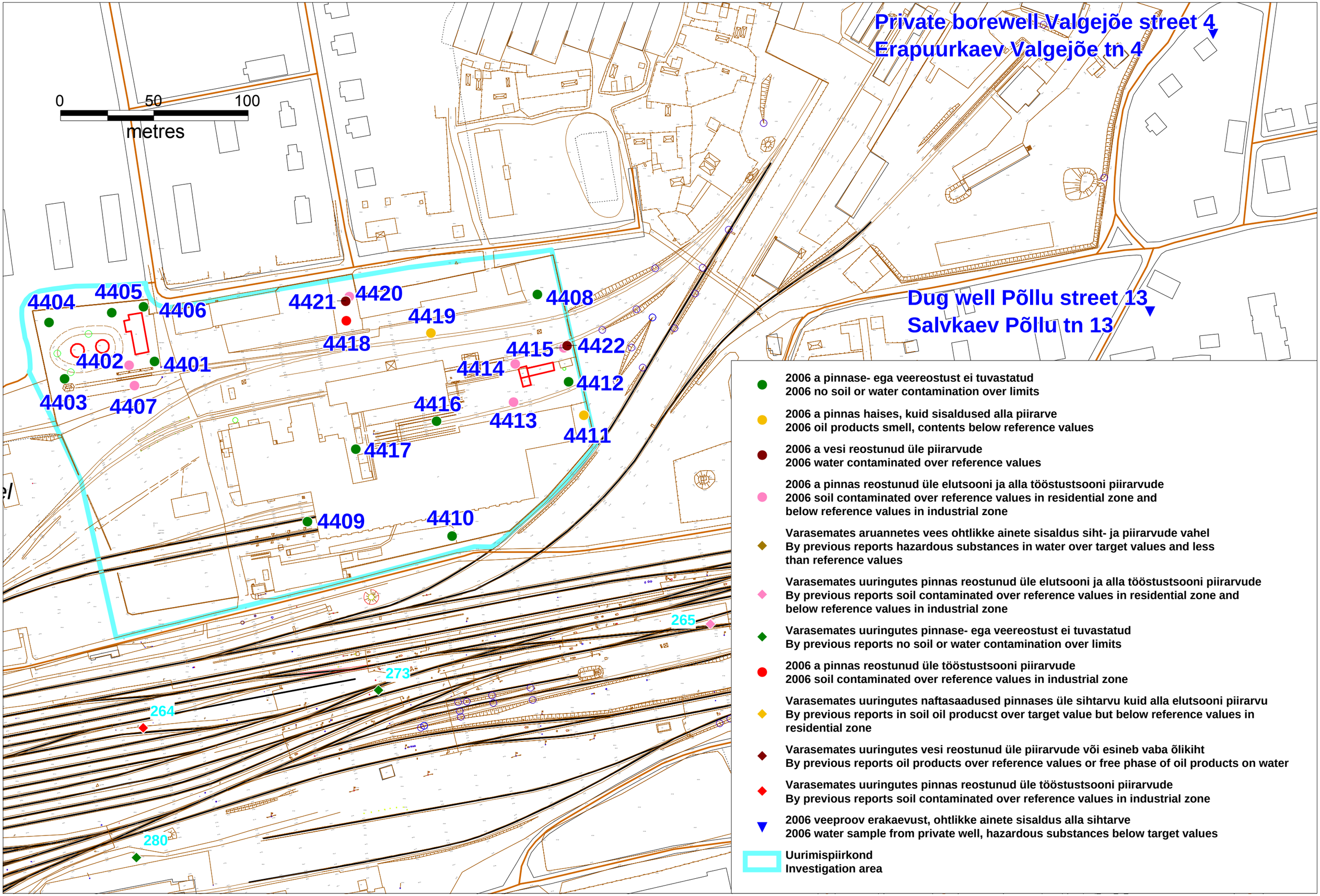
As the contaminated area of the Tapa Railway Depot Shed for railway carriages territory is watched and supervised there is no real risk (only by entrance into the underground tanks or by excavations) of coming to contact with hazardous substances for people. The area is a guarded and occurrence of strangers to the territory is not probable.

By calculations there is no direct danger of the spreading of the contaminated groundwater from investigated area into the existing water supply wells of Tapa Town taking water from Ordovician-Cambrian aquifer systems.
At the present time the Ordovician aquifer groundwater is contaminated with oil products for almost the entire territory of Tapa Town (generally caused by Tapa Military Air Base at Soviet time) and the identifying of contamination causer and source at nowadays is problematic on surrounding areas of Tapa Railway Depot Shed for railway carriages.

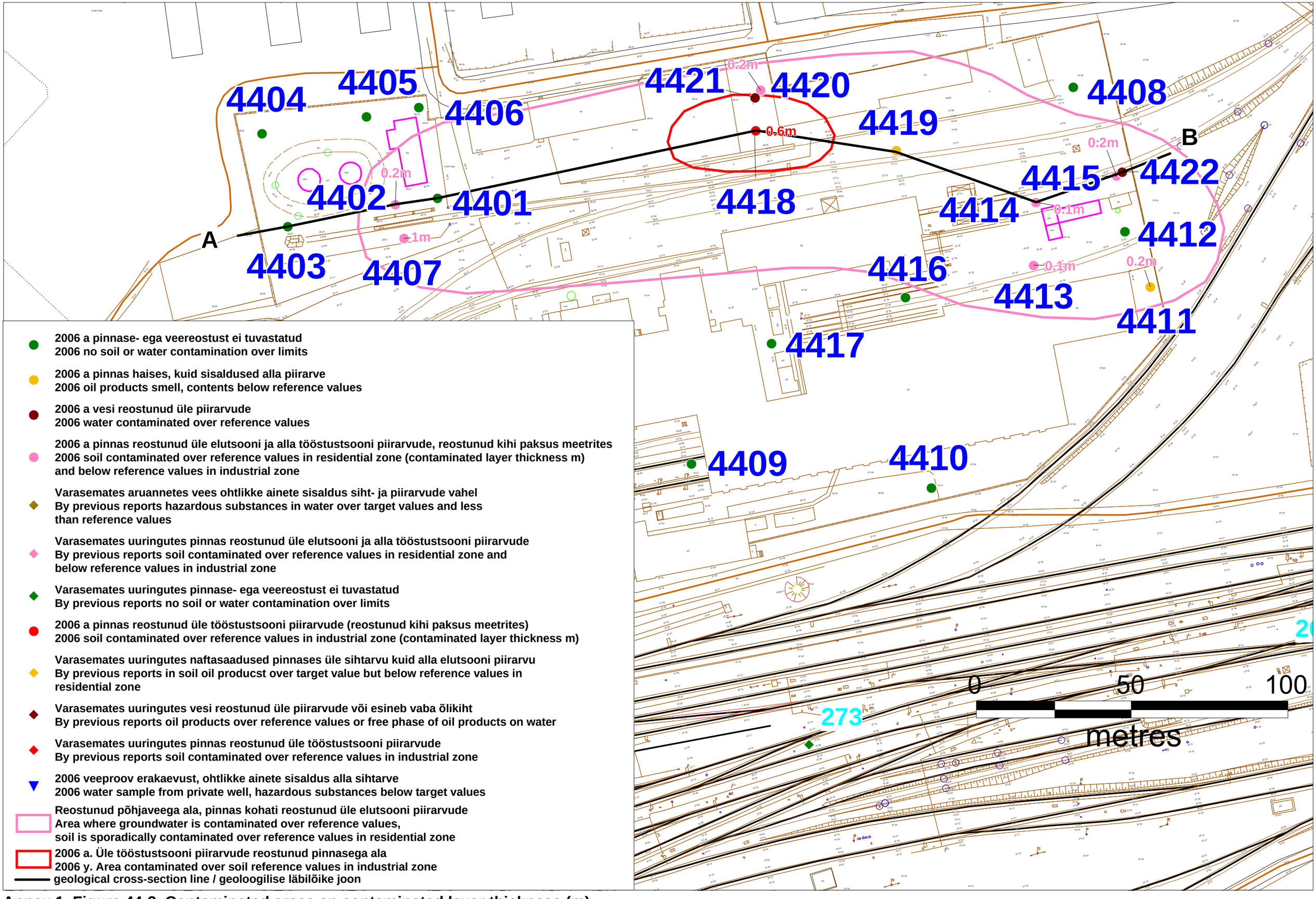


Annex 1 . Figure 44-1. Location of Tapa railway depots - Engine Shed JRK no. 43 and Shed for railway carriages JRK no.44

Lisa 1. Joonis 44-1. Tapa veduridepoo (JRK no 43) ja vagunidepoo (JRK no 44) paiknemine.



Annex 1. Figure 44-2. Sampling map
Lisa 1. Joonis 44-2. Uuringupunktide paiknemine

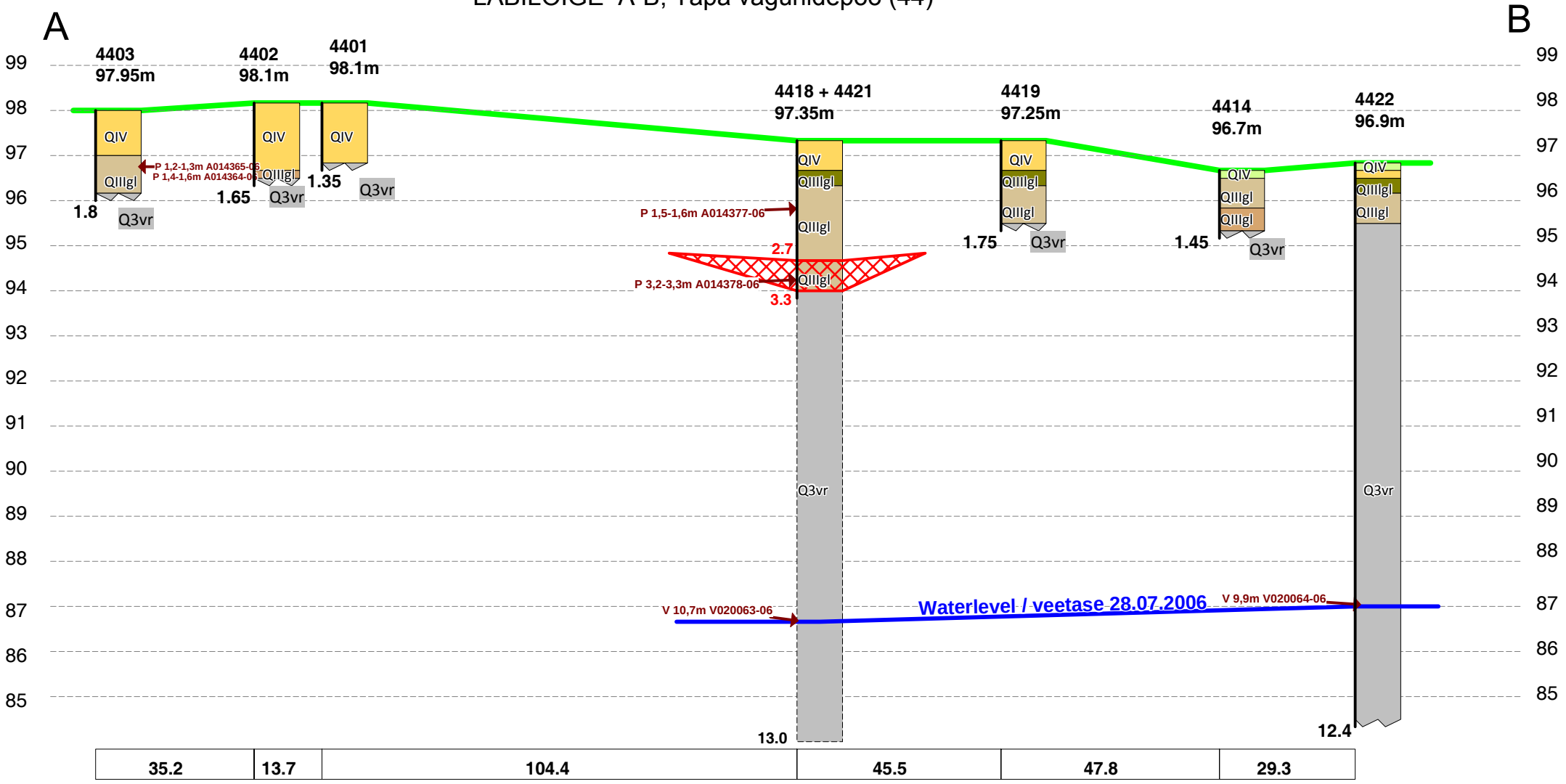


- 2006 a pinnase- ega veereostust ei tuvastatud
  2006 no soil or water contamination over limits
- 2006 a pinnas haises, kuid sisaldused alla piirarve
  2006 oil products smell, contents below reference values
- 2006 a vesi reostunud üle piirarvude
  2006 water contaminated over reference values
- 2006 a pinnas reostunud üle elutsooni ja alla tööstustsooni piirarvude, reostunud kihi paksus meetrites
  2006 soil contaminated over reference values in residential zone (contaminated layer thickness m) and below reference values in industrial zone
- Varasemates aruannetes vees ohtlikke ainete sisaldus siht- ja piirarvude vahel
  By previous reports hazardous substances in water over target values and less than reference values
- Varasemates uuringutes pinnas reostunud üle elutsooni ja alla tööstustsooni piirarvude
  By previous reports soil contaminated over reference values in residential zone and below reference values in industrial zone
- Varasemates uuringutes pinnase- ega veereostust ei tuvastatud
  By previous reports no soil or water contamination over limits
- 2006 a pinnas reostunud üle tööstustsooni piirarvude (reostunud kihi paksus meetrites)
  2006 soil contaminated over reference values in industrial zone (contaminated layer thickness m)
- Varasemates uuringutes naftasaadused pinnases üle sihtarvu kuid alla elutsooni piirarvu
  By previous reports in soil oil producst over target value but below reference values in residential zone
- Varasemates uuringutes vesi reostunud üle piirarvude või esineb vaba õlikiht
  By previous reports oil products over reference values or free phase of oil products on water
- Varasemates uuringutes pinnas reostunud üle tööstustsooni piirarvude
  By previous reports soil contaminated over reference values in industrial zone
- 2006 veeproov erakaevust, ohtlikke ainete sisaldus alla sihtarve
  2006 water sample from private well, hazardous substances below target values
- Reostunud põhjaveega ala, pinnas kohati reostunud üle elutsooni piirarvude
  Area where groundwater is contaminated over reference values, soil is sporadically contaminated over reference values in residential zone
- 2006 a. Üle tööstustsooni piirarvude reostunud pinnasega ala
  2006 y. Area contaminated over soil reference values in industrial zone
- geological cross-section line / geoloogilise läbilõike joon

Annex 1. Figure 44-3. Contaminated areas an contaminated layer thickness (m)
Lisa 1. Joonis 44-3. Reostunud alad ja reostunud kihi paksus meetrites

CROSS SECTION A-B, Tapa railway depot, Shed for railway carriages(44)
LÄBILÕIGE A-B, Tapa vagunidepoo (44)

Annex 2. Cross-section



Fill, sand, gravel, soil, rubbles, moraine, limestone scree
Täide, liiv, muld, killustik, saviliivmoreen, lubjakivirähk

Clayey silt moraine, 30-50% limestone pebbles and rubbles
Saviliivmoreen, jämepurdu 30-50%

Limestone
Lubjakivi

P 1,3-1,4m (A014440-06) — Soil or water sample depth and analysis number
Pinnase või veeproovi sügavus ja analüüsi number

Local moraine: yellowish-grey, contains >50% of coarse limestone rubble
Lokaalmoreen, kollakashall, jämepurdu >50%

Clayey silt: yellowish-brown, firm
Saviliiv, kollakaspruun, sitkeplastne

Ground relief
Maapinna reljeef

Soil, where hazardous substances content is over reference value in industrial zone
Pinnas, kus ohtlike ainete sisaldus on üle piirväärtuse tööstustsoonis

Soil
Muld

PA-4401
Absolute height of ground: 98.1m
X lambert 611100.3m Y lambert 6571390.5m
DESCRIPTIONS OF LAYERS ARE FOLLOWING:

0-1.3m QIV	fill: rubbles, soil, brick debris, dirty, grey, doesn't smell
1.3-1.35m Q3vr	limestone
Water not appear	28.07.2006

PA-4402
Absolute height of ground: 98.1m
X lambert 611086.7m Y lambert 6571388.1m
DESCRIPTIONS OF LAYERS ARE FOLLOWING:

0-1.4m QIV	fill: rubbles, limestone scree, doesn't smell
1.4-1.6m QIIIgl	local moraine: dirty yellowish-grey, firm, smells by oil products
1.6-1.65m Q3vr	limestone
Water not appear	28.07.2006
Soil(P)- and water(V) samples, depth and no:	P 1,4-1,6m A014364-06

PA-4403
Absolute height of ground: 97.95m
X lambert 611052.3m Y lambert 6571380.9m
DESCRIPTIONS OF LAYERS ARE FOLLOWING:

0-1m QIV	fill: rubbles, soil, limestone scree, doesn't smell;
1-1.75m QIIIgl	clayey silt moraine: yellowish-brown, firm, contains 35% of coarse limestone rubble, doesn't smell; lower 0,2 m contains >50% of coarse limestone rubble
1.75-1.8m Q3vr	limestone
Water not appear	28.07.2006
Soil(P)- and water(V) samples, depth and no:	P 1,2-1,3m A014365-06

PA-4404
Absolute height of ground: 98m
X lambert 611044.1m Y lambert 6571410.7m
DESCRIPTIONS OF LAYERS ARE FOLLOWING:

0-0.6m QIV	fill: rubbles, limestone scree, doesn't smell
0.6-0.8m QIIIgl	clayey silt moraine: brown, firm, contains 35% of coarse limestone rubble, doesn't smell
0.8-1.55m QIIIgl	local moraine: yellowish-grey, contains > 50% of coarse limestone rubble
1.55-1.6m Q3vr	limestone
Water not appear	28.07.2006

PA-4405
Absolute height of ground: 98.15m
X lambert 611077.5m Y lambert 6571416.1m
DESCRIPTIONS OF LAYERS ARE FOLLOWING:

0-0.5m QIV	fill: rubbles, soil, limestone scree, doesn't smell
0.5-1m QIIIgl	clayey silt moraine: greyish-brown, stiff, contains 30% of coarse limestone rubble, doesn't smell
1-1.05m Q3vr	limestone
Water not appear	28.07.2006
Soil(P)- and water(V) samples, depth and no:	P 0,8-1,0m A014366-06

PA-4406
Absolute height of ground: 98.3m
X lambert 611094.3m Y lambert 6571419.1m
DESCRIPTIONS OF LAYERS ARE FOLLOWING:

0-0.2m QIV	soil with stones: doesn't smell
0.2-0.8m QIIIgl	local moraine: contains >50% of coarse limestone rubble
0.8-1m QIIIgl	clayey silt moraine: brown, firm, contains 35% of coarse limestone rubble, doesn't smell
1-1.05m Q3vr	limestone
Water not appear	28.07.2006
Soil(P)- and water(V) samples, depth and no:	P 0,8-1,0m A014367-06

PA-4407
Absolute height of ground: 97.95m
X lambert 611089.5m Y lambert 6571377.1m
DESCRIPTIONS OF LAYERS ARE FOLLOWING:

0-0.4m QIV	fill: soil, rubbles, at top thin (0,02 m) layer of hardened oil
0.4-1m QIIIgl	clayey silt moraine: brown, firm, contains 35% of coarse limestone rubble, doesn't smell
1-1.5m QIIIgl	local moraine: doesn't smell
1.5-1.55m Q3vr	limestone
Water not appear	28.07.2006
Soil(P)- and water(V) samples, depth and no:	P 0,6-0,7m A014368-06

PA-4408
Absolute height of ground: 97m
X lambert 611303.9m Y lambert 6571426.9m
DESCRIPTIONS OF LAYERS ARE FOLLOWING:

0-0.9m QIV	fill: upper 0,6 m rubbles, limestone scree, doesn't smell; from 0,6 m slag, black, doesn't smell
0.9-1.2m QIV	fill: rubbles, doesn't smell
1.2-1.6m QIIIgl	clayey silt moraine: yellowish-grey, firm, contains 35% of coarse limestone rubble, doesn't smell
1.6-1.65m Q3vr	limestone
Water not appear	28.07.2006

PA-4409

Absolute height of ground: 97.1m
X lambert 611181.7m Y lambert 6571304.8m
DESCRIPTIONS OF LAYERS ARE FOLLOWING:

0-0.45m QIV	fill: rubbles, limestone scree
0.45-0.55m QIV	fill: clayey silt, black, dirty, doesn't smell
0.55-1m QIV	fill: rubbles, clayey silt, doesn't smell
1-1.7m QIIIgl	clayey silt moraine: brownish-grey, firm, contains 35% of coarse limestone rubble, doesn't smell
1.7-1.75m Q3vr	limestone
Water not appear	28.07.2006
Soil(P)- and water(V) samples, depth and no:	P 0,45-0,55m A014369-06; P 1,4-1,7m A014370-06

PA-4410

Absolute height of ground: 97.15m
X lambert 611258.7m Y lambert 6571297.2m
DESCRIPTIONS OF LAYERS ARE FOLLOWING:

0-0.2m QIV	soil: doesn't smell
0.2-0.4m QIV	fill: rubbles, doesn't smell
0.4-0.7m QIIIlgl	clayey silt: brown, firm, doesn't smell
0.7-1.2m QIIIgl	clayey silt moraine: yellowish-grey, firm, contains >50% of coarse limestone rubble, doesn't smell
1.2-1.25m Q3vr	limestone
Water not appear	28.07.2006
Soil(P)- and water(V) samples, depth and no:	P 0,4-0,5m A014371-06

PA-4411

Absolute height of ground: 96.55m
X lambert 611328.9m Y lambert 6571361.5m
DESCRIPTIONS OF LAYERS ARE FOLLOWING:

0-0.2m QIV	fill: upper 0,05 m asphalt; lower rubbles, doesn't smell
0.2-0.4m QIV	fill: coarse sand, brown, medium compacted, humid, doesn't smell
0.4-0.5m QIV	soil: doesn't smell
0.5-0.7m QIIIgl	clayey silt moraine: brown, firm, contains 35% of coarse limestone rubble, doesn't smell
0.7-0.9m QIIIgl	local moraine: contains 50% of coarse limestone rubble, smells little by oil products
0.9-0.95m Q3vr	limestone
Water not appear	28.07.2006

PA-4412

Absolute height of ground: 96.85m
X lambert 611320.8m Y lambert 6571379.2m
DESCRIPTIONS OF LAYERS ARE FOLLOWING:

0-0.2m QIV	soil: doesn't smell
0.2-0.5m QIV	fill: clayey silt, soil, doesn't smell
0.5-0.8m QIIIlgl	clayey silt: brown, stiff, doesn't smell
0.8-1.2m QIIIgl	clayey silt moraine: brown, firm, contains 35% of coarse limestone rubble, doesn't smell
1.2-1.25m Q3vr	limetone
Water not appear	28.07.2006
Soil(P)- and water(V) samples, depth and no:	P 0,9-1,0m A014372-06

PA-4413

Absolute height of ground: 96.7m
X lambert 611291.5m Y lambert 6571368.5m
DESCRIPTIONS OF LAYERS ARE FOLLOWING:

0-0.5m QIV	fill: rubbles, doesn't smell
0.5-0.6m QIV	soil with rubbles: doesn't smell
0.6-1.3m QIIIgl	clayey silt moraine: yellowish-grey, firm, contains >50% of coarse limestone rubble, doesn't smell
1.3-1.4m QIIIgl	local moraine: contains >50% of coarse limestone rubble, dirty grey, oily
1.4-1.45m Q3vr	limestone
Water not appear	28.07.2006
Soil(P)- and water(V) samples, depth and no:	P 1,3-1,4m A014373-06

PA-4414

Absolute height of ground: 96.7m
X lambert 611292.3m Y lambert 6571388.7m
DESCRIPTIONS OF LAYERS ARE FOLLOWING:

0-0.2m QIV	soil: doesn't smell
0.2-0.9m QIIIgl	clayey silt moraine: brown, firm, contains 35% of coarse limestone rubble, doesn' smell
0.9-1.4m QIIIgl	local moraine: contains >50% of coarse limestone rubble; lower 0,1 m dirty, grey, oily
1.4-1.45m Q3vr	limestone
Water not appear	28.07.2006

PA-4415

Absolute height of ground: 96.8m
X lambert 611318.1m Y lambert 6571397.1m
DESCRIPTIONS OF LAYERS ARE FOLLOWING:

0-0.2m QIV	soil: doesn't smell
0.2-0.4m QIV	fill: coarse sand, yellowish-brown, medium compacted, humid, doesn't smell
0.4-0.7m QIIIlgl	clayey silt: brown, firm, doesn't smell
0.7-1.4m QIIIgl	clayey silt moraine: yellowish-grey, firm, contains 35% of coarse limestone rubble; lower 0,2 m with black oily lines, doesn't smell
1.4-1.45m Q3vr	limestone
Water not appear	28.07.2006
Soil(P)- and water(V) samples, depth and no:	P 0,5-0,6m A014374-06

PA-4416

Absolute height of ground: 96.5m
X lambert 611250.4m Y lambert 6571358.2m
DESCRIPTIONS OF LAYERS ARE FOLLOWING:

0-0.4m QIV	fill: rubbles, doesn't smell
0.4-0.45m QIV	soil with stones: doesn't smell
0.45-1.35m QIIIgl	clayey silt moraine: yellowish-grey, firm, contains 30% of coarse limestone rubble, doesn't smell; from 0,85 m contains >50% of coarse limestone rubble
1.35-1.4m Q3vr	limestone
Water not appear	28.07.2006

PA-4417

Absolute height of ground: 96.9m
X lambert 611207.4m Y lambert 6571343.5m
DESCRIPTIONS OF LAYERS ARE FOLLOWING:

0-0.6m QIV	fill: soil, rubbles, doesn't smell
0.6-0.85m QIIIgl	clayey silt moraine: dirty yellowish-grey, firm, contains 35% of coarse limestone rubble, doesn't smell
0.85-1.7m QIIIgl	clayey silt moraine: yellowish-grey, firm, contains 50% of coarse limestone rubble, on limestone appears some water, doesn't smell;
1.7-1.75m Q3vr	limestone
Water not appear	28.07.2006
Soil(P)- and water(V) samples, depth and no:	P 0,7-0,8m A014375-06; P 1,5-1,6m A014376-06

PA-4418

Absolute height of ground: 97.35m
X lambert 611202.4m Y lambert 6571411.7m
DESCRIPTIONS OF LAYERS ARE FOLLOWING:

0-0.7m QIV	fill: rubbles, soil, doesn't smell
0.7-1m QIIIgl	clayey silt: brown, firm, doesn't smell
1-2.7m QIIIgl	clayey silt moraine: greyish-brown, firm, contains 35% of coarse limestone rubble, doesn't smell
2.7-3.3m QIIIgl	clayey silt moraine: brown, firm, contains 35% of coarse limestone rubble, in some parts oily, smells by oil products
3.3-3.35m Q3vr	limestone
Water not appear	28.07.2006
Soil(P)- and water(V) samples, depth and no:	P 1,5-1,6m A014377-06; P 3,2-3,3m A014378-06

PA-4419

Absolute height of ground: 97.25m
X lambert 611247.4m Y lambert 6571405.2m
DESCRIPTIONS OF LAYERS ARE FOLLOWING:

0-0.6m QIV	fill: rubbles, doesn't smell
0.6-1m QIIIgl	clayey silt: yellowish-brown, firm, doesn't smell, in some places dark lines
1-1.7m QIIIgl	clayey silt moraine: yellowish-brown, firm, contains > 50% of coarse limestone rubble, doesn't smell
1.7-1.75m Q3vr	limestone: on limestone surface appears some water which smells by oil products
Water not appear	28.07.2006

PA-4420

Absolute height of ground: 97.4m
X lambert 611203.9m Y lambert 6571424.6m
DESCRIPTIONS OF LAYERS ARE FOLLOWING:

0-0.5m QIV	fill: upper 0,1 m soil; from 0,1 m rubbles
0.5-2.8m QIV	fill: rubbles, from 1,6 m mixed with limestone pieces and clayey silt, doesn't smell
2.8-3m QIIIgl	clayey silt moraine: yellowish-grey, firm, contains >50% of coarse limestone rubble
3-3.2m QIIIgl	local moraine: black, contains >50% of coarse limestone rubble, smells by oil products, on limestone surface appears some water
3.2-3.25m Q3vr	limestone
Water not appear	28.07.2006
Soil(P)- and water(V) samples, depth and no:	P 3,0-3,2m A014379-06

PA-4421

Absolute height of ground: 97.45m
X lambert 611202.1m Y lambert 6571422.1m
DESCRIPTIONS OF LAYERS ARE FOLLOWING:

0-2.8m QIV	fill: upper 0,1 m soil; below rubbles, doesn't smell; from 1,6 m mixed with limestone pieces, doesn't smell
2.8-3.2m QIIIgl	clayey silt moraine: yellowish-grey, firm, contains >50% of coarse limestone rubble, doesn't smell
3.2-13m Q3vr	limestone: grey, with single dry fissures, from 11,5 m appears water
Waterlevel from ground 10.7m	28.07.2006
Soil(P)- and water(V) samples, depth and no:	V 10,7-13,0m V020063-06

PA-4422

Absolute height of ground: 96.87m
X lambert 611319.9m Y lambert 6571398.3m
DESCRIPTIONS OF LAYERS ARE FOLLOWING:

0-0.2m QIV	soil. doesn't smell
0.2-0.4m QIV	fill: coarse sand, yellowish-brown, medium compacted, humid, doesn't smell
0.4-0.7m QIIIlgl	clayey silt: brown, firm, doesn't smell
0.7-1.4m QIIIgl	clayey silt moraine: yellowish-grey, firm, contains 35% of coarse limestone rubble; lower 0,2 m with black oily lines, doesn't smell
1.4-12.4m Q3vr	limestone: grey, fissured (fissures at depth 5,0; 6,2; 8; 10; and 12 m; fissure at depth 12 m appears oily water
Waterlevel from ground 9.9m	28.07.2006
Soil(P)- and water(V) samples, depth and no:	V 9,9-12,4m V020064-06 (free oil phase on groundwater)

PUURAUGU VÕI PUURKAEVU ARVESTUSKAART

Arvestuskaardi number:	……..……	Riiklik katastrinumber:	……**19886**…..……
PUURAUGU VÕI PUURKAEVU ANDMED			
Passi number:	……..……	Puurimise aeg:	**11.07.2006**
Asukoht:	**Lääne Virumaa, Tapa linn, Tapa vagunidepoo (Tapa Raudteejaama maaüksus 79101:017:0006)** *maaüksuse tunnus/ tänav/ asula/ vald/ linn/ maakond*		
Koordinaadid: **Lambert Euref EST 92** Keskkonnaministri "….."…… 2006. a	Nurgakoordinaadid: x= 611202.1m, y= 6571422.2m ……611202.1……..….... p. l. ……6571422.2……..i. p.		
Lisa: puuraugu või -kaevu asukoha joonis mõõtkavas 1:500 kuni 1:1 000 ja 1:10 000 kuni 1:150 000			
PUURAUGU VÕI PUURKAEVU PROJEKTEERIJA ANDMED			
Hüdrogeoloogiliste tööde litsentsi omaniku nimi:	**AS Maves**		
Hüdrogeoloogiliste tööde litsentsi number:	**136**		
Hüdrogeoloogiliste tööde litsentsi andmise kuupäev:	**01.11.2005**		
Puuraugu või puurkaevu projekti number:	**Puurauk 4421**		
Kontaktandmed:	aadress: **Marja 4d, Tallinn, 10617** ……..…….…...……. telefon: **6565428**……. e-post: …**maves@online.ee**……..		
PUURAUGU VÕI PUURKAEVU PUURIJA ANDMED			
Hüdrogeoloogiliste tööde litsentsi omaniku nimi:	**AS Maves**		
Hüdrogeoloogiliste tööde litsentsi number:	**136**		
Hüdrogeoloogiliste tööde litsentsi andmise kuupäev:	**01.11.2005**		
Kontaktandmed:	aadress: **Marja 4d, Tallinn, 10617** ……..…….…...……. telefon: **6565428**……. e-post: …**maves@online.ee**……..		
PUURAUGU VÕI PUURKAEVU ANDMED			
Sanitaarkaitseala ulatus:	……..**10**…….. meetrit		
Vee kasutamise otstarve:	……**reostuskolde seire**…...…….		
Sügavus:	……..…**13.0**…….. meetrit	Pinna absoluutne kõrgus:	**96.45** meetrit
Põhjaveekiht:	……..……S-O…….……...……		

Geoloogline läbilõige:

Nr	Litoloogiline kirjeldus	Geoloogline indeks	Kihi paksus (m)	Kihi lamami sügavus (m)	Veekihi lasuvussügavus intervall (m)
1.	Täide, muld, killustik, alates 1.6m lubjakvi lahmakatega	QIV kult	2.8	2.8	

2.	Saviliivmoreen, kollakashall, sitkeplastne, jmp >50%	QIII gl	0.4	3.2	
3.	Lubjakivi helehall kõva, üksikud kuivad lõhed 11.5m ilmus vesi.	O3 vr	9.8	13	10.7

Tootlikkus:	……10…….. m^3 ööpäevas
Puurimise tehnika:	……URB 2A2……..

Konstruktsioon:

Jrk nr	Puurauk		Manteldus			
	Puurimise diameeter mm	Vahemik (m)	Manteltoru diameeter (mm)	Algus (m)	Lõpp (m)	Pikkus (m)
1.	132	0-3.5	108	+0.9	3.5	4.4
2.	93	3.5-13.0				

Puurkaevu töötav osa:	..… Lubjakivis filtrita 3.5-13.0m ……..
Filtri konstruktsioon ja paigutus:	..……filtrit pole……..
Tihendid:	..……pole……..
Tamponaaž:	..……savitamponaaz…….. ..……..
Pumpamise tehnika ja kestvus:	..…sukelpump……..

Deebit (l/s)	Alanemine (m)	Erideebit (l/s)	Staatiline veetase (m)
0.2	0.2	1	10.9

PÕHJAVEE ANALÜÜSID

Veeproovide võtmise kuupäev:	…… **28.07.20006**……..
Labori nimi ja registrikood:	…… **Lantmännen Analycen AB, Rootsi**……..
Bakterioloogiline analüüs:	..……**EI**……
Termotolerantsed coli-laadsed bakterid:	…… pesa/100 cm^3
Coli-laadsed bakterid:	…… pesa/100 cm^3
Heterotroofsed bakterid:	…… pesa/cm^3

Üldkeemilised veeanalüüsid: **vaid ohtlikud ained, vaata tabel järgmisel lehel**

Labori nimi ja registrikood:	…… **Lantmännen Analycen AB, Rootsi** …..

Kuiv-jääk	Na^+	K^+	NH_4^+	Ca^{2+}	Mg^{2+}	Mn^{2+}	$Fe^{üld}$	Cl^-	SO_4^{2-}	NO_3^{2-}	NO_2^-	HCO_3^-	Fl^-	Üldka-redus	pH	mgO/l
mg/l														mg-ekv		
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

Arvestuskaardi täitja nimi:	..……Indrek Tamm……
Arvestuskaardi täitja allkiri:	 ……
Arvestuskaardi täitmise kuupäev:	..……15.jaanuar 2007……

Puurkaevu vesi ei vasta määratud komponentidest benseeni osas Keskkonnaministri 2. aprilli 2004. a määrus nr 12 „Pinnases ja põhjavees ohtlike ainete sisalduse piirnormid" nõuetele, sotsiaalministri 31. juuli 2001. a. määruse nr 82 „Joogivee kvaliteedi- ja kontrollinõuded ning analüüsimeetodid*" nõuetest on ületatud lisaks benseenile ka polütsükliliste aromaatsete süsivesinike (PAH) sisaldused.

Kuna seirekaev paikneb põhjaveereostuse vahetus läheduses ja sisaldab joogiveena kasutamisel ülemääraselt benseeni ja polütsüklilisi aromaatseid süsivesinikke on vesi joogiks kõlbmatu.

Seirekaev on suletud veevõtu vältimiseks metallist lukustatava päisega.

Puurkaevu akti tellija: Keskkonnaministeeriumi veeosakond

Kaevu valdaja esindaja: Argo Sakkool, Keskkonnaministeeriumi veeosakond

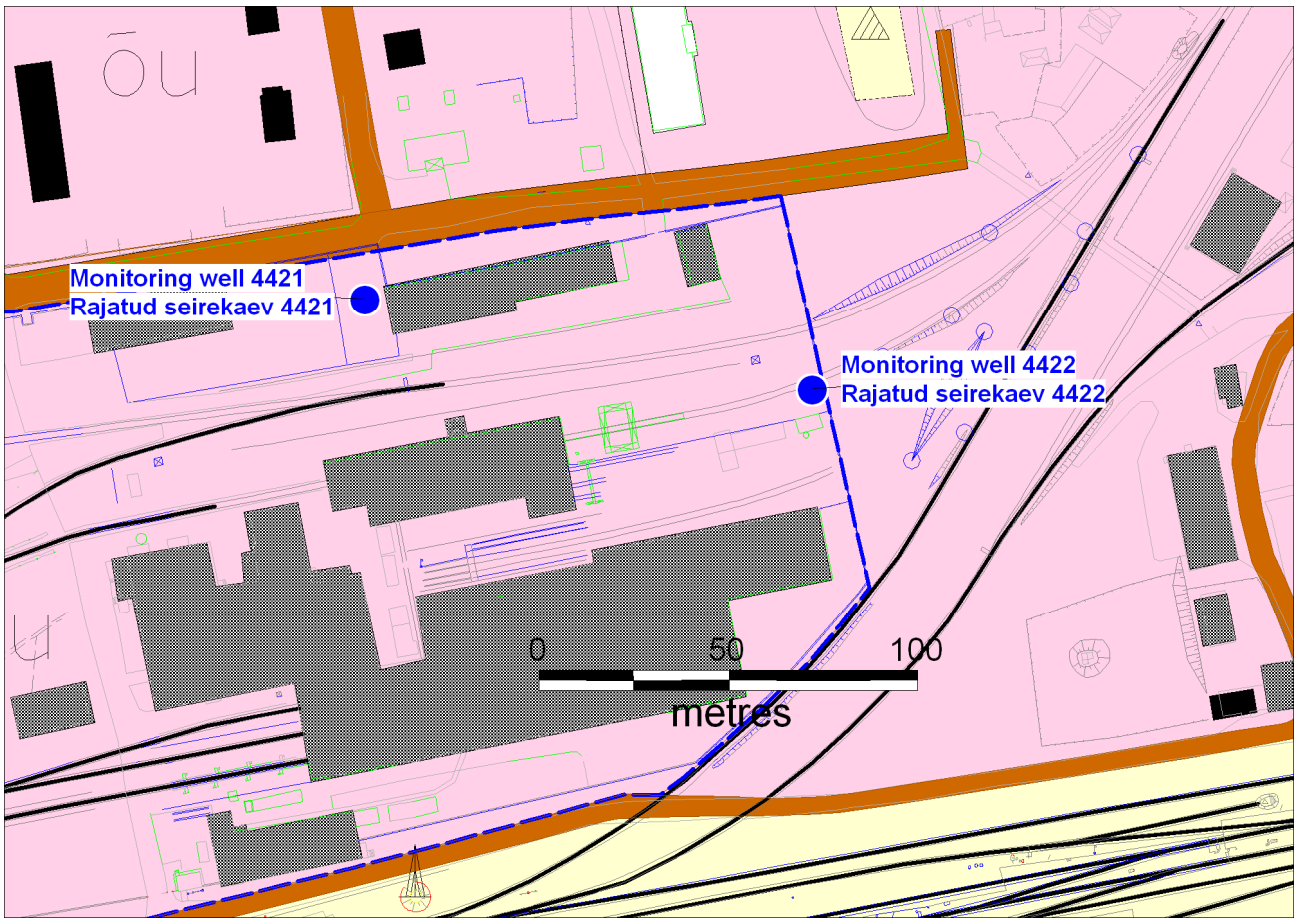
AS Maves juhatuse liige  Indrek Tamm

AnalyCen		
Sampling person		Mati Salu
Sample Point		JRK 44 Tapa Vagunidepoo
Sample		V020063-06
Sample name		4421
Sample depth		10.7
Sampling method		
Sample Date		2006-07-28
Group 1 Volatile Organic Compounds		
	Units	
Benzene	µg/l	9
Toluene	µg/l	12
Xylene	mg/l	0.002
Ethylbenzene	µg/l	<1
Sum TEX	mg/l	0.014
Styrene	µg/l	<1
MTBE	µg/l	<0.01
Chloroorganic aromatics		
Chlorobenzene	µg/l	<1
2-Chlorotoluene	µg/l	<1
4-Chlorotoluene	µg/l	<1
1,3-dichlorobenzene	µg/l	<1
1,4-dichlorobenzene	µg/l	<1
1,2-dichlorobenzene	µg/l	<1
1,2,4-trichlorobenzene	µg/l	<1
1,2,3-trichlorobenzene	µg/l	<1
1,2-dichloroethane	µg/l	<1
Hexachloroethane	µg/l	<0.10
Chloroform	µg/l	<1
Auxiliary volatile organic compunds		
Isopropylbenzene	µg/l	<1
Propylbenzene	µg/l	<1
1,3,5-trimetylbenzene	µg/l	<1
Tert-butylbenzene	µg/l	<1
1,2,4-trimetylbenzene	µg/l	<1
Sec-butylbenzene	µg/l	<1
p-isopropylbenzene	µg/l	<1
Butylbenzene	µg/l	<1
Fluortrichloromethane	µg/l	<1
1,1,2-trichloroethane	µg/l	<1
1,1-dichloroethene	µg/l	<1
1,1,1,2-Tetrachloroethane	µg/l	<1
Tetrachloroethene	µg/l	<1
Dichloromethane	µg/l	<1
1,3-dichloropropane	µg/l	<1
Trans-1,2-dichloroethene	µg/l	<1

AnalyCen		
Sampling person		Mati Salu
Sample Point		JRK 44 Tapa Vagunidepoo
Sample		V020063-06
Sample name		4421
Sample depth		10.7
Sampling method		
Sample Date		2006-07-28
Dibromchloromethane	µg/l	<1
1,1-dichloroethane	µg/l	<1
1,2-dibromoethane	µg/l	<1
2,2-dichloropropane	µg/l	<1
Cis-1,2-dichloroethene	µg/l	<1
Bromoform	µg/l	<1
Bromobenzene	µg/l	<1
1,1,1-trichlorethane	µg/l	<1
1,2,3-trichloropropane	µg/l	<1
Tetrachloromethane	µg/l	<1
1,1-dichloropropane	µg/l	<1
Trichloroethene	µg/l	<1
1,2-dichloropropane	µg/l	<1
Dibrommethane	µg/l	<1
Bromchloromethane	µg/l	<1
Bromodichloromethane	µg/l	<1
Hexachlorobutadien	µg/l	<1
1,3-Dichloropropene	µg/l	<1
Group 2 Extractive compounds		
Aliphatics >C5-C8	mg/l	<0.02
Aliphatics >C8-C10	mg/l	<0.02
Aliphatics >C10-C12	mg/l	<0.02
Aliphatics >C12-C16	mg/l	0.03
Aliphatics >C16-C35	mg/l	0.35
Aromatics >C8-C10	mg/l	<0.1
Aromatics >C10-C35	mg/l	<0.1
Poly Chlorinated Biphenyls PCBs		
2,4,4'-Trichlorobiphenyl	µg/l	<0.10
2,2',5,5'-Tetrachlorobiphenyl	µg/l	<0.10
2,2',4,5,5'-Pentachlorobiphenyl	µg/l	<0.10
2,3',4,4',5'-Pentachlorobiphenyl	µg/l	<0.10
2,4,5,2',4',5'-Hexachlorobiphenyl	µg/l	<0.10
2,2',3,4,4',5'-Hexachlorobiphenyl	µg/l	<0.10
2,2',3,4,4',5,5'-Heptachlorobiphenyl	µg/l	<0.10
Group 3 Phenols and Cresols		
Phenol	µg/l	<1.00
m-cresol	µg/l	<1.00
o-cresol	µg/l	<1.00

AnalyCen		
Sampling person		Mati Salu
Sample Point		JRK 44 Tapa Vagunidepoo
Sample		V020063-06
Sample name		4421
Sample depth		10.7
Sampling method		
Sample Date		2006-07-28
p-cresol	µg/l	<1.00
2,3-dimethylphenol	µg/l	<1.00
3,4-dimethylphenol	µg/l	<1.00
2,6-dimethylphenol	µg/l	<1.00
Sum dichlorophenol	µg/l	<1.0
Sum trichlorophenol	µg/l	<1.0
Sum tetrachlorophenol	µg/l	<1.0
Chlorophenol	µg/l	<1.0
Sum cresols	µg/l	<3.0
Group 5 PAH		
Anthracene	µg/l	0.38
Phenanthrene	µg/l	0.84
Pyrene	µg/l	1.55
Acenaphthene	µg/l	<0.10
Chrysene	µg/l	0.37
Naphtalene	µg/l	<0.10
α-methylnaphtalene	µg/l	<0.10
β-methylnaphtalene	µg/l	<0.10
Acenaphtalene	µg/l	0.13
Benzo(a)pyrene	µg/l	0.1
Benzo(a)anthracene	µg/l	0.21
Benzo(b,k)fluorantene	µg/l	0.15
Indeno(1,2,3,c,d)pyrene	µg/l	<0.10
Dibenzo(a,h)anthracene	µg/l	<0.10
9H-Fluorene	µg/l	0.11
Fluorantene	µg/l	0.54
Benzo(g,h,i)perylene	µg/l	<0.10
Dibenzofuran	µg/l	<0.10
Carbazole	µg/l	<0.10
Sum carcinogenic PAH	µg/l	0.73
Sum other PAH	µg/l	3.6
Group 7 Metals		
Cadmium	mg/l	<0.00002
Lead	mg/l	<0.00005
Strontium	mg/l	0.23
Arsenic	mg/l	0.00035
Copper	mg/l	<0.0002
Chromium	mg/l	<0.0002

AnalyCen		
Sampling person		Mati Salu
Sample Point		JRK 44 Tapa Vagunidepoo
Sample		V020063-06
Sample name		4421
Sample depth		10.7
Sampling method		
Sample Date		2006-07-28
Nickel	mg/l	0.00086
Zinc	mg/l	0.01
Lantmännen Analycen AB		
31.10.2006		
Caroline Karlsson		


Monitoring well 4421
Rajatud seirekaev 4421
Monitoring well 4422
Rajatud seirekaev 4422
0
50
100
metres

M 1:2000

PUURAUGU VÕI PUURKAEVU ARVESTUSKAART

Arvestuskaardi number:	……..……	Riiklik katastrinumber:	……**19887**…..……
PUURAUGU VÕI PUURKAEVU ANDMED			
Passi number:	……..……	Puurimise aeg:	**11.07.2006**
Asukoht:	**Lääne Virumaa, Tapa linn, Tapa vagunidepoo** (Tapa Raudteejaama maaüksus 79101:017:0006) *maaüksuse tunnus/ tänav/ asula/ vald/ linn/ maakond*		
Koordinaadid: **Lambert Euref EST 92** Keskkonnaministri "….."…… 2006. a	Nurgakoordinaadid: x= 611320.0m, y= 6571398.3m ……611320.0……..….... p. l. ……6571398.3……..i. p.		
Lisa: puuraugu või -kaevu asukoha joonis mõõtkavas 1:500 kuni 1:1 000 ja 1:10 000 kuni 1:150 000			
PUURAUGU VÕI PUURKAEVU PROJEKTEERIJA ANDMED			
Hüdrogeoloogiliste tööde litsentsi omaniku nimi:	**AS Maves**		
Hüdrogeoloogiliste tööde litsentsi number:	**136**		
Hüdrogeoloogiliste tööde litsentsi andmise kuupäev:	**01.11.2005**		
Puuraugu või puurkaevu projekti number:	**Puurauk 4422**		
Kontaktandmed:	aadress: **Marja 4d, Tallinn, 10617** telefon: **6565428**……. e-post: …**maves@online.ee**……..		
PUURAUGU VÕI PUURKAEVU PUURIJA ANDMED			
Hüdrogeoloogiliste tööde litsentsi omaniku nimi:	**AS Maves**		
Hüdrogeoloogiliste tööde litsentsi number:	**136**		
Hüdrogeoloogiliste tööde litsentsi andmise kuupäev:	**01.11.2005**		
Kontaktandmed:	aadress: **Marja 4d, Tallinn, 10617** telefon: **6565428**……. e-post: …**maves@online.ee**……..		
PUURAUGU VÕI PUURKAEVU ANDMED			
Sanitaarkaitseala ulatus:	……..**10**…….. meetrit		
Vee kasutamise otstarve:	……**reostuskolde seire**…...…….		
Sügavus:	……..…**12.4**…….. meetrit	Pinna absoluutne kõrgus:	**96.87** meetrit
Põhjaveekiht:	……..……S-O…….……...……		

Geoloogline läbilõige:

Nr	Litoloogiline kirjeldus	Geoloogline indeks	Kihi paksus (m)	Kihi lamami sügavus (m)	Veekihi lasuvussügavus intervall (m)
1.	Muld	QIV	0.2	0.2	
2.	Täide, jämeliiv, kollakaspruun,keskihe, niiske	QIV kult	0.2	0.4	
3.	Saviliiv, pruun, sitkeplastne	QIII lgl	0.3	0.7	

4.	Saviliivmoreen, kollakashall, sitkeplastne, jmp 35%, alumina 0.2m mustade õliste viirgudega	QIII gl	0.7	1.4	
5.	Lubjakivi helehall kõva, lõheline (5.0, 6.2, 8.0, 10, 12m) 12.0m ilmus õline vesi	O3 vr	11.0	12.4	9.9

Tootlikkus:	……10…….. m^3 ööpäevas
Puurimise tehnika:	……URB 2A2……..

Konstruktsioon:

Jrk nr	Puurauk		Manteldus			
	Puurimise diameeter mm	Vahemik (m)	Manteltoru diameeter (mm)	Algus (m)	Lõpp (m)	Pikkus (m)
1.	132	0-2.1	108	+0.73	2.1	2.83
2.	93	2.1-12.4				

Puurkaevu töötav osa:	..… Lubjakivis filtrita 32.1-12.4m……..
Filtri konstruktsioon ja paigutus:	……filtrit pole……..
Tihendid:	……pole……..
Tamponaaž:	……savitamponaaz…….. ……..
Pumpamise tehnika ja kestvus:	..…sukelpump……..

Deebit (l/s)	Alanemine (m)	Erideebit (l/s)	Staatiline veetase (m)
0.2	0.2	1	10.1

PÕHJAVEE ANALÜÜSID

Veeproovide võtmise kuupäev:	…… **28.07.20006**……..
Labori nimi ja registrikood:	…… **Lantmännen Analycen AB, Rootsi**……..
Bakterioloogiline analüüs:	……**EI**……
Termotolerantsed coli-laadsed bakterid:	…… pesa/100 cm^3
Coli-laadsed bakterid:	…… pesa/100 cm^3
Heterotroofsed bakterid:	…… pesa/cm^3

Üldkeemilised veeanalüüsid: **vaid ohtlikud ained, vaata tabel järgmisel lehel**

Labori nimi ja registrikood:	…… **Lantmännen Analycen AB, Rootsi** …..

Kuiv-jääk	Na^+	K^+	NH_4^+	Ca^{2+}	Mg^{2+}	Mn^{2+}	$Fe^{üld}$	Cl^-	SO_4^{2-}	NO_3^{2-}	NO_2^-	HCO_3^-	Fl^-	Üldka-redus	pH	mgO/l
mg/l														mg-ekv		
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…

Arvestuskaardi täitja nimi:	……Indrek Tamm……
Arvestuskaardi täitja allkiri:	……
Arvestuskaardi täitmise kuupäev:	……15.jaanuar 2007……

Puurkaevu vesi ei vasta määratud komponentidest naftasaaduste ja polütsükliliste aromaatsete süsivesinike (PAH) osas Keskkonnaministri 2. aprilli 2004. a määrus nr 12 „Pinnases ja põhjavees ohtlike ainete sisalduse piirnormid" nõuetele, sotsiaalministri 31. juuli 2001. a. määruse nr 82 „Joogivee kvaliteedi- ja kontrollinõuded ning analüüsimeetodid*" nõuetest on ületatud polütsükliliste aromaatsete süsivesinike (PAH) sisaldused.

Kuna seirekaev paikneb põhjaveereostuse vahetus läheduses ja sisaldab joogiveena kasutamisel ülemääraselt benseeni ja polütsüklilisi aromaatseid süsivesinikke on vesi joogiks kõlbmatu.

Seirekaev on suletud veevõtu vältimiseks metallist lukustatava päisega.

Puurkaevu akti tellija: Keskkonnaministeeriumi veeosakond

Kaevu valdaja esindaja: Argo Sakkool, Keskkonnaministeeriumi veeosakond

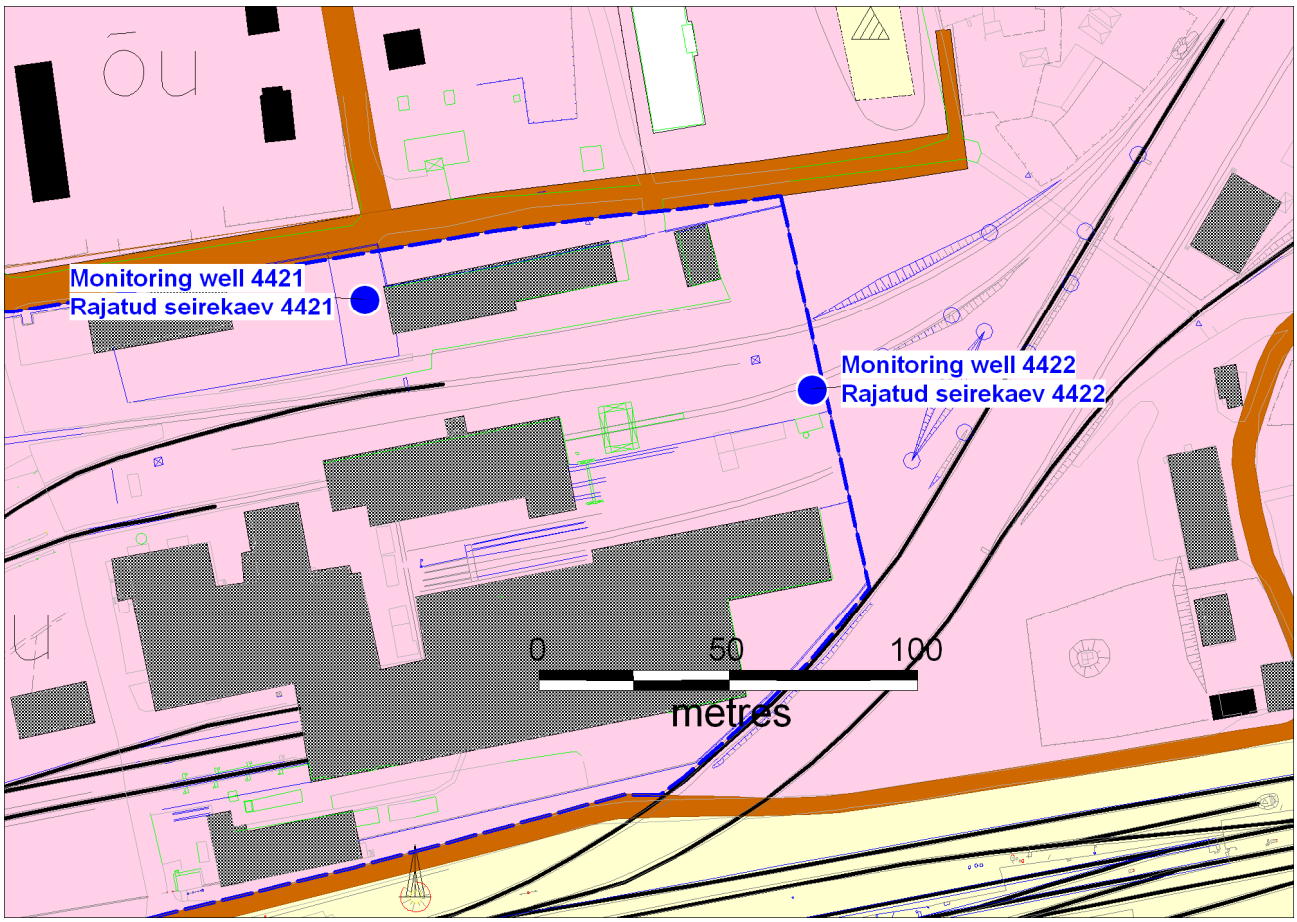
AS Maves juhatuse liige  Indrek Tamm

AnalyCen		
Sampling person		Mati Salu
Sample Point		JRK 44 Tapa Vagunidepoo
Sample		V020064-06
Sample name		4422
Sample depth		9.9m
Sampling method		A209:35
Sample Date		2006-07-28
Group 1 Volatile Organic Compounds		
	Units	
Benzene	µg/l	<0.2
Toluene	µg/l	6
Xylene	mg/l	0.022
Ethylbenzene	µg/l	6
Sum TEX	mg/l	0.028
Styrene	µg/l	<1
MTBE	µg/l	<0.01
Chloroorganic aromatics		
Chlorobenzene	µg/l	<1
2-Chlorotoluene	µg/l	<1
4-Chlorotoluene	µg/l	<1
1,3-dichlorobenzene	µg/l	<1
1,4-dichlorobenzene	µg/l	<1
1,2-dichlorobenzene	µg/l	<1
1,2,4-trichlorobenzene	µg/l	<1
1,2,3-trichlorobenzene	µg/l	<1
1,2-dichloroethane	µg/l	<1
Hexachloroethane	µg/l	<0.10
Chloroform	µg/l	<1
Auxiliary volatile organic compunds		
Isopropylbenzene	µg/l	8
Propylbenzene	µg/l	2
1,3,5-trimetylbenzene	µg/l	2
Tert-butylbenzene	µg/l	3
1,2,4-trimetylbenzene	µg/l	4
Sec-butylbenzene	µg/l	4
p-isopropylbenzene	µg/l	18
Butylbenzene	µg/l	7
Fluortrichloromethane	µg/l	<1
1,1,2-trichloroethane	µg/l	<1
1,1-dichloroethene	µg/l	<1
1,1,1,2-Tetrachloroethane	µg/l	<1
Tetrachloroethene	µg/l	<1
Dichloromethane	µg/l	<1
1,3-dichloropropane	µg/l	<1
Trans-1,2-dichloroethene	µg/l	<1

AnalyCen		
Sampling person		Mati Salu
Sample Point		JRK 44 Tapa Vagunidepoo
Sample		V020064-06
Sample name		44-22
Sample depth		9.9m
Sampling method		A209:35
Sample Date		2006-07-28
Dibromchloromethane	µg/l	<1
1,1-dichloroethane	µg/l	<1
1,2-dibromoethane	µg/l	<1
2,2-dichloropropane	µg/l	<1
Cis-1,2-dichloroethene	µg/l	<1
Bromoform	µg/l	<1
Bromobenzene	µg/l	<1
1,1,1-trichlorethane	µg/l	<1
1,2,3-trichloropropane	µg/l	<1
Tetrachloromethane	µg/l	<1
1,1-dichloropropane	µg/l	<1
Trichloroethene	µg/l	<1
1,2-dichloropropane	µg/l	<1
Dibrommethane	µg/l	<1
Bromchloromethane	µg/l	<1
Bromodichloromethane	µg/l	<1
Hexachlorobutadien	µg/l	<1
1,3-Dichloropropene	µg/l	<1
Group 2 Extractive compounds		
Aliphatics >C5-C8	mg/l	<0.02
Aliphatics >C8-C10	mg/l	<0.02
Aliphatics >C10-C12	mg/l	0.66
Aliphatics >C12-C16	mg/l	5.9
Aliphatics >C16-C35	mg/l	77
Aromatics >C8-C10	mg/l	<0.1
Aromatics >C10-C35	mg/l	311
Poly Chlorinated Biphenyls PCBs		
2,4,4'-Trichlorobiphenyl	µg/l	<0.10
2,2',5,5'-Tetrachlorobiphenyl	µg/l	<0.10
2,2',4,5,5'-Pentachlorobiphenyl	µg/l	<0.10
2,3',4,4',5'-Pentachlorobiphenyl	µg/l	<0.10
2,4,5,2',4',5'-Hexachlorobiphenyl	µg/l	<0.10
2,2',3,4,4',5'-Hexachlorobiphenyl	µg/l	<0.10
2,2',3,4,4',5,5'-Heptachlorobiphenyl	µg/l	<0.10
Group 3 Phenols and Cresols		
Phenol	µg/l	<1.00
m-cresol	µg/l	<1.00
o-cresol	µg/l	<1.00

AnalyCen		
Sampling person		Mati Salu
Sample Point		JRK 44 Tapa Vagunidepoo
Sample		V020064-06
Sample name		44-22
Sample depth		9.9m
Sampling method		A209:35
Sample Date		2006-07-28
p-cresol	µg/l	<1.00
2,3-dimethylphenol	µg/l	<1.00
3,4-dimethylphenol	µg/l	<1.00
2,6-dimethylphenol	µg/l	<1.00
Sum dichlorophenol	µg/l	<1.0
Sum trichlorophenol	µg/l	<1.0
Sum tetrachlorophenol	µg/l	<1.0
Chlorophenol	µg/l	<1.0
Sum cresols	µg/l	<3.0
Group 5 PAH		
Anthracene	µg/l	9
Phenanthrene	µg/l	16
Pyrene	µg/l	5
Acenaphthene	µg/l	7
Chrysene	µg/l	30
Naphtalene	µg/l	4
α-methylnaphtalene	µg/l	5
β-methylnaphtalene	µg/l	1
Acenaphtalene	µg/l	1
Benzo(a)pyrene	µg/l	7
Benzo(a)anthracene	µg/l	9
Benzo(b,k)fluorantene	µg/l	4
Indeno(1,2,3,c,d)pyrene	µg/l	1
Dibenzo(a,h)anthracene	µg/l	1
9H-Fluorene	µg/l	10
Fluorantene	µg/l	7
Benzo(g,h,i)perylene	µg/l	1
Dibenzofuran	µg/l	1
Carbazole	µg/l	5
Sum carcinogenic PAH	µg/l	45
Sum other PAH	µg/l	60
Group 7 Metals		
Cadmium	mg/l	0.0016
Lead	mg/l	0.13
Strontium	mg/l	0.25
Arsenic	mg/l	0.0053
Copper	mg/l	0.0055
Chromium	mg/l	0.0011

AnalyCen		
Sampling person		Mati Salu
Sample Point		JRK 44 Tapa Vagunidepoo
Sample		V020064-06
Sample name		44-22
Sample depth		9.9m
Sampling method		A209:35
Sample Date		2006-07-28
Nickel	mg/l	0.0062
Zinc	mg/l	0.26
Lantmännen Analycen AB		
31.10.2006		
Caroline Karlsson		


Monitoring well 4421
Rajatud seirekaev 4421
Monitoring well 4422
Rajatud seirekaev 4422
0
50
100
metres

M 1:2000

Sampling person	MS	MS	MS
Sample Point	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo
Sample	A014364-06	A014365-06	A014366-06
Sample name	44-02	44-03	44-05
Sample depth	1,4-1,6	1,2-1,3	0,8-1,0
Sampling method			
Sample Date	2006-07-24	2006-07-24	2006-07-24
Units	mg/kg DW	mg/kg DW	mg/kg DW
Concentrations are reported per Dry Weight			
Group 1 Volatile Organic Compounds			
Benzene	<0.005	<0.005	<0.005
Toluene	0,007	<0.005	<0.005
Xylene	< 0.1	< 0.1	< 0.1
Ethylbenzene	<0.005	<0.005	<0.005
Sum TEX	< 0.1	< 0.1	< 0.1
Styrene	<0.005	<0.005	<0.005
MTBE	< 0.1	< 0.1	< 0.1
Chloroorganic aromatics			
Chlorobenzene	<0.005	<0.005	<0.005
2-Chlorotoluene	<0.005	<0.005	<0.005
4-Chlorotoluene	<0.005	<0.005	<0.005
1,3-dichlorobenzene	<0.005	<0.005	<0.005
1,4-dichlorobenzene	<0.005	<0.005	<0.005
1,2-dichlorobenzene	<0.005	<0.005	<0.005
1,2,4-trichlorobenzene	<0.005	<0.005	<0.005
1,2,3-trichlorobenzene	<0.005	<0.005	<0.005
1,2-dichloroethane	<0.005	<0.005	<0.005
Hexachloroethane	<0.10	<0.10	<0.10
Choroform	<0.005	<0.005	<0.005
Auxiliary volatile organic compunds			
Isopropylbenzene	<0.005	<0.005	<0.005
Propylbenzene	<0.005	<0.005	<0.005
1,3,5-trimetylbenzene	0,018	<0.005	<0.005
Tert-butylbenzene	<0.005	<0.005	<0.005
1,2,4-trimetylbenzene	0,01	<0.005	<0.005
Sec-butylbenzene	<0.005	<0.005	<0.005
p-isopropylbenzene	<0.005	<0.005	<0.005
Butylbenzene	<0.005	<0.005	<0.005
Fluortrichloromethane	<0.005	<0.005	<0.005
1,1,2-trichloroethane	<0.005	<0.005	<0.005
1,1-dichloroethene	<0.005	<0.005	<0.005
1,1,1,2-Tetrachloroethane	<0.005	<0.005	<0.005
Tetrachloroethene	<0.005	<0.005	<0.005
Dichloromethane	<0.005	<0.005	<0.005
1,3-dichloropropane	<0.005	<0.005	<0.005
Trans-1,2-dichloroethene	<0.005	<0.005	<0.005
Dibromchloromethane	<0.005	<0.005	<0.005
1,1-dichloroethane	<0.005	<0.005	<0.005
1,2-dibromoethane	<0.005	<0.005	<0.005
2,2-dichloropropane	<0.005	<0.005	<0.005
Cis-1,2-dichloroethene	<0.005	<0.005	<0.005
Bromoform	<0.005	<0.005	<0.005
Bromobenzene	<0.005	<0.005	<0.005

Sampling person	MS	MS	MS
Sample Point	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo
Sample	A014367-06	A014368-06	A014369-06
Sample name	44-06	44-07	44-09
Sample depth	0,8-1,0	0,6-0,7	0,45-0,55
Sampling method			
Sample Date	2006-07-24	2006-07-24	2006-07-25
Units	mg/kg DW	mg/kg DW	mg/kg DW
Concentrations are reported per Dry Weight			
Group 1 Volatile Organic Compounds			
Benzene	<0.005	<0.005	<0.005
Toluene	0,0081	<0.005	<0.005
Xylene	< 0.1	< 0.1	< 0.1
Ethylbenzene	<0.005	<0.005	<0.005
Sum TEX	< 0.1	< 0.1	< 0.1
Styrene	<0.005	<0.005	<0.005
MTBE	< 0.1	< 0.1	< 0.1
Chloroorganic aromatics			
Chlorobenzene	<0.005	<0.005	<0.005
2-Chlorotoluene	<0.005	<0.005	<0.005
4-Chlorotoluene	<0.005	<0.005	<0.005
1,3-dichlorobenzene	<0.005	<0.005	<0.005
1,4-dichlorobenzene	<0.005	<0.005	<0.005
1,2-dichlorobenzene	<0.005	<0.005	<0.005
1,2,4-trichlorobenzene	<0.005	<0.005	<0.005
1,2,3-trichlorobenzene	<0.005	<0.005	<0.005
1,2-dichloroethane	<0.005	<0.005	<0.005
Hexachloroethane	<0.10	<0.10	<0.10
Chloroform	<0.005	<0.005	<0.005
Auxiliary volatile organic compunds			
Isopropylbenzene	<0.005	<0.005	<0.005
Propylbenzene	<0.005	<0.005	<0.005
1,3,5-trimetylbenzene	<0.005	<0.005	<0.005
Tert-butylbenzene	<0.005	<0.005	<0.005
1,2,4-trimetylbenzene	<0.005	<0.005	<0.005
Sec-butylbenzene	<0.005	<0.005	<0.005
p-isopropylbenzene	<0.005	<0.005	<0.005
Butylbenzene	<0.005	<0.005	<0.005
Fluortrichloromethane	<0.005	<0.005	<0.005
1,1,2-trichloroethane	<0.005	<0.005	<0.005
1,1-dichloroethene	<0.005	<0.005	<0.005
1,1,1,2-Tetrachloroethane	<0.005	<0.005	<0.005
Tetrachloroethene	<0.005	<0.005	<0.005
Dichloromethane	<0.005	<0.005	<0.005
1,3-dichloropropane	<0.005	<0.005	<0.005
Trans-1,2-dichloroethene	<0.005	<0.005	<0.005
Dibromchloromethane	<0.005	<0.005	<0.005
1,1-dichloroethane	<0.005	<0.005	<0.005
1,2-dibromoethane	<0.005	<0.005	<0.005
2,2-dichloropropane	<0.005	<0.005	<0.005
Cis-1,2-dichloroethene	<0.005	<0.005	<0.005
Bromoform	<0.005	<0.005	<0.005
Bromobenzene	<0.005	<0.005	<0.005

Sampling person	MS	MS	MS
Sample Point	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo
Sample	A014370-06	A014371-06	A014372-06
Sample name	44-09	44-10	44-12
Sample depth	1,4-1,7	0,4-0,5	0,9-1,0
Sampling method			
Sample Date	2006-07-25	2006-07-25	2006-07-25
Units	mg/kg DW	mg/kg DW	mg/kg DW
Concentrations are reported per Dry Weight			
Group 1 Volatile Organic Compounds			
Benzene	<0.005	<0.005	<0.005
Toluene	<0.005	<0.005	<0.005
Xylene	< 0.1	< 0.1	< 0.1
Ethylbenzene	<0.005	<0.005	<0.005
Sum TEX	< 0.1	< 0.1	< 0.1
Styrene	<0.005	<0.005	<0.005
MTBE	< 0.1	< 0.1	< 0.1
Chloroorganic aromatics			
Chlorobenzene	<0.005	<0.005	<0.005
2-Chlorotoluene	<0.005	<0.005	<0.005
4-Chlorotoluene	<0.005	<0.005	<0.005
1,3-dichlorobenzene	<0.005	<0.005	<0.005
1,4-dichlorobenzene	<0.005	<0.005	<0.005
1,2-dichlorobenzene	<0.005	<0.005	<0.005
1,2,4-trichlorobenzene	<0.005	<0.005	<0.005
1,2,3-trichlorobenzene	<0.005	<0.005	<0.005
1,2-dichloroethane	<0.005	<0.005	<0.005
Hexachloroethane	<0.10	<0.10	<0.10
Chloroform	<0.005	<0.005	<0.005
Auxiliary volatile organic compunds			
Isopropylbenzene	<0.005	<0.005	<0.005
Propylbenzene	<0.005	<0.005	<0.005
1,3,5-trimetylbenzene	<0.005	<0.005	<0.005
Tert-butylbenzene	<0.005	<0.005	<0.005
1,2,4-trimetylbenzene	<0.005	<0.005	<0.005
Sec-butylbenzene	<0.005	<0.005	<0.005
p-isopropylbenzene	<0.005	<0.005	<0.005
Butylbenzene	<0.005	<0.005	<0.005
Fluortrichloromethane	<0.005	<0.005	<0.005
1,1,2-trichloroethane	<0.005	<0.005	<0.005
1,1-dichloroethene	<0.005	<0.005	<0.005
1,1,1,2-Tetrachloroethane	<0.005	<0.005	<0.005
Tetrachloroethene	<0.005	<0.005	<0.005
Dichloromethane	<0.005	<0.005	<0.005
1,3-dichloropropane	<0.005	<0.005	<0.005
Trans-1,2-dichloroethene	<0.005	<0.005	<0.005
Dibromchloromethane	<0.005	<0.005	<0.005
1,1-dichloroethane	<0.005	<0.005	<0.005
1,2-dibromoethane	<0.005	<0.005	<0.005
2,2-dichloropropane	<0.005	<0.005	<0.005
Cis-1,2-dichloroethene	<0.005	<0.005	<0.005
Bromoform	<0.005	<0.005	<0.005
Bromobenzene	<0.005	<0.005	<0.005

Sampling person	MS	MS	MS
Sample Point	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo
Sample	A014373-06	A014374-06	A014375-06
Sample name	44-13	44-15	44-17
Sample depth	1,3-1,4	0,5-0,6	0,7-0,8
Sampling method			
Sample Date	2006-07-25	2006-07-25	2006-07-25
Units	mg/kg DW	mg/kg DW	mg/kg DW
Concentrations are reported per Dry Weight			
Group 1 Volatile Organic Compounds			
Benzene	<0.005	<0.005	<0.005
Toluene	<0.005	<0.005	<0.005
Xylene	< 0.1	< 0.1	< 0.1
Ethylbenzene	<0.005	<0.005	<0.005
Sum TEX	< 0.1	< 0.1	< 0.1
Styrene	<0.005	<0.005	<0.005
MTBE	< 0.1	< 0.1	< 0.1
Chloroorganic aromatics			
Chlorobenzene	<0.005	<0.005	<0.005
2-Chlorotoluene	<0.005	<0.005	<0.005
4-Chlorotoluene	<0.005	<0.005	<0.005
1,3-dichlorobenzene	<0.005	<0.005	<0.005
1,4-dichlorobenzene	<0.005	<0.005	<0.005
1,2-dichlorobenzene	<0.005	<0.005	<0.005
1,2,4-trichlorobenzene	<0.005	<0.005	<0.005
1,2,3-trichlorobenzene	<0.005	<0.005	<0.005
1,2-dichloroethane	<0.005	<0.005	<0.005
Hexachloroethane	<0.10	<0.10	<0.10
Chloroform	<0.005	<0.005	<0.005
Auxiliary volatile organic compunds			
Isopropylbenzene	<0.005	<0.005	<0.005
Propylbenzene	<0.005	<0.005	<0.005
1,3,5-trimetylbenzene	<0.005	<0.005	<0.005
Tert-butylbenzene	<0.005	<0.005	<0.005
1,2,4-trimetylbenzene	<0.005	<0.005	<0.005
Sec-butylbenzene	<0.005	<0.005	<0.005
p-isopropylbenzene	<0.005	<0.005	<0.005
Butylbenzene	<0.005	<0.005	<0.005
Fluortrichloromethane	<0.005	<0.005	<0.005
1,1,2-trichloroethane	<0.005	<0.005	<0.005
1,1-dichloroethene	<0.005	<0.005	<0.005
1,1,1,2-Tetrachloroethane	<0.005	<0.005	<0.005
Tetrachloroethene	<0.005	<0.005	<0.005
Dichloromethane	<0.005	<0.005	<0.005
1,3-dichloropropane	<0.005	<0.005	<0.005
Trans-1,2-dichloroethene	<0.005	<0.005	<0.005
Dibromchloromethane	<0.005	<0.005	<0.005
1,1-dichloroethane	<0.005	<0.005	<0.005
1,2-dibromoethane	<0.005	<0.005	<0.005
2,2-dichloropropane	<0.005	<0.005	<0.005
Cis-1,2-dichloroethene	<0.005	<0.005	<0.005
Bromoform	<0.005	<0.005	<0.005
Bromobenzene	<0.005	<0.005	<0.005

Sampling person	MS	MS	MS
Sample Point	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo
Sample	A014376-06	A014377-06	A014378-06
Sample name	44-17	44-18	44-18
Sample depth	1,5-1,6	1,5-1,6	3,2-3,3
Sampling method			SS028150-2
Sample Date	2006-07-25	2006-07-25	2006-07-25
Units	mg/kg DW	mg/kg DW	mg/kg DW
Concentrations are reported per Dry Weight			
Group 1 Volatile Organic Compounds			
Benzene	<0.005	<0.005	< 0.01
Toluene	<0.005	<0.005	< 0.1
Xylene	< 0.1	< 0.1	0,21
Ethylbenzene	<0.005	<0.005	7,8
Sum TEX	< 0.1	< 0.1	8
Styrene	<0.005	<0.005	<0.005
MTBE	< 0.1	< 0.1	< 0.1
Chloroorganic aromatics			
Chlorobenzene	<0.005	<0.005	<0.005
2-Chlorotoluene	<0.005	<0.005	<0.005
4-Chlorotoluene	<0.005	<0.005	<0.005
1,3-dichlorobenzene	<0.005	<0.005	<0.005
1,4-dichlorobenzene	<0.005	<0.005	<0.005
1,2-dichlorobenzene	<0.005	<0.005	<0.005
1,2,4-trichlorobenzene	<0.005	<0.005	<0.005
1,2,3-trichlorobenzene	<0.005	<0.005	<0.005
1,2-dichloroethane	<0.005	<0.005	<0.005
Hexachloroethane	<0.10	<0.10	<0.10
Chloroform	<0.005	<0.005	<0.005
Auxiliary volatile organic compunds			
Isopropylbenzene	<0.005	<0.005	0,6
Propylbenzene	<0.005	<0.005	0,089
1,3,5-trimetylbenzene	<0.005	<0.005	0,1
Tert-butylbenzene	<0.005	<0.005	<0.005
1,2,4-trimetylbenzene	<0.005	<0.005	0,34
Sec-butylbenzene	<0.005	<0.005	0,29
p-isopropylbenzene	<0.005	<0.005	0,06
Butylbenzene	<0.005	<0.005	<0.005
Fluortrichloromethane	<0.005	<0.005	<0.005
1,1,2-trichloroethane	<0.005	<0.005	<0.005
1,1-dichloroethene	<0.005	<0.005	<0.005
1,1,1,2-Tetrachloroethane	<0.005	<0.005	<0.005
Tetrachloroethene	<0.005	<0.005	<0.005
Dichloromethane	<0.005	<0.005	<0.005
1,3-dichloropropane	<0.005	<0.005	<0.005
Trans-1,2-dichloroethene	<0.005	<0.005	<0.005
Dibromchloromethane	<0.005	<0.005	<0.005
1,1-dichloroethane	<0.005	<0.005	<0.005
1,2-dibromoethane	<0.005	<0.005	<0.005
2,2-dichloropropane	<0.005	<0.005	<0.005
Cis-1,2-dichloroethene	<0.005	<0.005	<0.005
Bromoform	<0.005	<0.005	<0.005
Bromobenzene	<0.005	<0.005	<0.005

Sampling person	MS
Sample Point	JRK 44 Tapa Vagunidepoo
Sample	A014379-06
Sample name	44-20
Sample depth	3,0-3,2
Sampling method	SS028150-2
Sample Date	2006-07-25
Units	mg/kg DW
Concentrations are reported per Dry Weight	
Group 1 Volatile Organic Compounds	
Benzene	< 0.01
Toluene	< 0.1
Xylene	< 0.1
Ethylbenzene	< 0.1
Sum TEX	< 0.1
Styrene	<0.005
MTBE	< 0.1
Chloroorganic aromatics	
Chlorobenzene	<0.005
2-Chlorotoluene	<0.005
4-Chlorotoluene	<0.005
1,3-dichlorobenzene	<0.005
1,4-dichlorobenzene	<0.005
1,2-dichlorobenzene	<0.005
1,2,4-trichlorobenzene	<0.005
1,2,3-trichlorobenzene	<0.005
1,2-dichloroethane	<0.005
Hexachloroethane	<0.10
Chloroform	<0.005
Auxiliary volatile organic compunds	
Isopropylbenzene	0,023
Propylbenzene	0,041
1,3,5-trimetylbenzene	<0.005
Tert-butylbenzene	<0.005
1,2,4-trimetylbenzene	<0.005
Sec-butylbenzene	0,086
p-isopropylbenzene	<0.005
Butylbenzene	<0.005
Fluortrichloromethane	<0.005
1,1,2-trichloroethane	<0.005
1,1-dichloroethene	<0.005
1,1,1,2-Tetrachloroethane	<0.005
Tetrachloroethene	<0.005
Dichloromethane	<0.005
1,3-dichloropropane	<0.005
Trans-1,2-dichloroethene	<0.005
Dibromchloromethane	<0.005
1,1-dichloroethane	<0.005
1,2-dibromoethane	<0.005
2,2-dichloropropane	<0.005
Cis-1,2-dichloroethene	<0.005
Bromoform	<0.005
Bromobenzene	<0.005

Sampling person	MS	MS	MS
Sample Point	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo
Sample	A014364-06	A014365-06	A014366-06
Sample name	44-02	44-03	44-05
Sample depth	1,4-1,6	1,2-1,3	0,8-1,0
Sampling method			
Sample Date	2006-07-24	2006-07-24	2006-07-24
Units	mg/kg DW	mg/kg DW	mg/kg DW
Concentrations are reported per Dry Weight			
1,1,1-trichlorethane	<0.005	<0.005	<0.005
1,2,3-trichloropropane	<0.005	<0.005	<0.005
Tetrachloromethane	<0.005	<0.005	<0.005
1,1-dichloropropane	<0.005	<0.005	<0.005
Trichloroethene	<0.005	<0.005	<0.005
1,2-dichloropropane	<0.005	<0.005	<0.005
Dibrommethane	<0.005	<0.005	<0.005
Bromchloromethane	<0.005	<0.005	<0.005
Bromodichloromethane	<0.005	<0.005	<0.005
Hexachlorobutadien	<0.005	<0.005	<0.005
1,3-Dichloropropene	<0.005	<0.005	<0.005
Group 2 Extractive compounds			
Aliphatics >C5-C8	< 5	< 5	< 5
Aliphatics >C8-C10	< 5	< 5	< 5
Aliphatics >C10-C12	21	<5	<5
Aliphatics >C12-C16	52	<5	<5
Aliphatics >C16-C35	290	<10	<10
Aromatics >C8-C10	<5	<5	<5
Aromatics >C10-C35	170	<10	<10
Poly Chlorinated Biphenyls PCBs			
2,4,4'-Trichlorobiphenyl	<0.10	<0.10	<0.10
2,2',5,5'-Tetrachlorobiphenyl	<0.10	<0.10	<0.10
2,2',4,5,5'-Pentachlorobiphenyl	<0.10	<0.10	<0.10
2,3',4,4',5'-Pentachlorobiphenyl	<0.10	<0.10	<0.10
2,4,5,2',4',5'-Hexachlorobiphenyl	<0.10	<0.10	<0.10
2,2',3,4,4',5'-Hexachlorobiphenyl	<0.10	<0.10	<0.10
2,2',3,4,4',5,5'-Heptachlorobiphenyl	<0.10	<0.10	<0.10
Group 3 Phenols and Cresols			
Phenol	<1.00	<1.00	<1.00
m-cresol	<1.00	<1.00	<1.00
o-cresol	<1.00	<1.00	<1.00
p-cresol	<1.00	<1.00	<1.00
2,3-dimethylphenol	<1.00	<1.00	<1.00
3,4-dimethylphenol	<1.00	<1.00	<1.00
2,6-dimethylphenol	<1.00	<1.00	<1.00
Sum dichlorophenol	<1.0	<1.0	<1.0
Sum trichlorophenol	<1.0	<1.0	<1.0
Sum tetrachlorophenol	<1.0	<1.0	<1.0
Chlorophenol	<1.0	<1.0	<1.0
Sum cresols	<3.0	<3.0	<3.0

Sampling person	MS	MS	MS
Sample Point	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo
Sample	A014367-06	A014368-06	A014369-06
Sample name	44-06	44-07	44-09
Sample depth	0,8-1,0	0,6-0,7	0,45-0,55
Sampling method			
Sample Date	2006-07-24	2006-07-24	2006-07-25
Units	mg/kg DW	mg/kg DW	mg/kg DW
Concentrations are reported per Dry Weight			
1,1,1-trichlorethane	<0.005	<0.005	<0.005
1,2,3-trichloropropane	<0.005	<0.005	<0.005
Tetrachloromethane	<0.005	<0.005	<0.005
1,1-dichloropropane	<0.005	<0.005	<0.005
Trichloroethene	<0.005	<0.005	<0.005
1,2-dichloropropane	<0.005	<0.005	<0.005
Dibrommethane	<0.005	<0.005	<0.005
Bromchloromethane	<0.005	<0.005	<0.005
Bromodichloromethane	<0.005	<0.005	<0.005
Hexachlorobutadien	<0.005	<0.005	<0.005
1,3-Dichloropropene	<0.005	<0.005	<0.005
Group 2 Extractive compounds			
Aliphatics >C5-C8	< 5	< 5	< 5
Aliphatics >C8-C10	< 5	< 5	< 5
Aliphatics >C10-C12	<5	<5	<5
Aliphatics >C12-C16	<5	<5	<5
Aliphatics >C16-C35	<10	<10	<10
Aromatics >C8-C10	<5	<5	<5
Aromatics >C10-C35	<10	<10	<10
Poly Chlorinated Biphenyls PCBs			
2,4,4'-Trichlorobiphenyl	<0.10	<0.10	<0.10
2,2',5,5'-Tetrachlorobiphenyl	<0.10	<0.10	<0.10
2,2',4,5,5'-Pentachlorobiphenyl	<0.10	<0.10	<0.10
2,3',4,4',5'-Pentachlorobiphenyl	<0.10	<0.10	<0.10
2,4,5,2',4',5'-Hexachlorobiphenyl	<0.10	<0.10	<0.10
2,2',3,4,4',5'-Hexachlorobiphenyl	<0.10	<0.10	<0.10
2,2',3,4,4',5,5'-Heptachlorobiphenyl	<0.10	<0.10	<0.10
Group 3 Phenols and Cresols			
Phenol	<1.00	<1.00	<1.00
m-cresol	<1.00	<1.00	<1.00
o-cresol	<1.00	<1.00	<1.00
p-cresol	<1.00	<1.00	<1.00
2,3-dimethylphenol	<1.00	<1.00	<1.00
3,4-dimethylphenol	<1.00	<1.00	<1.00
2,6-dimethylphenol	<1.00	<1.00	<1.00
Sum dichlorophenol	<1.0	<1.0	<1.0
Sum trichlorophenol	<1.0	<1.0	<1.0
Sum tetrachlorophenol	<1.0	<1.0	<1.0
Chlorophenol	<1.0	<1.0	<1.0
Sum cresols	<3.0	<3.0	<3.0

Sampling person	MS	MS	MS
Sample Point	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo
Sample	A014370-06	A014371-06	A014372-06
Sample name	44-09	44-10	44-12
Sample depth	1,4-1,7	0,4-0,5	0,9-1,0
Sampling method			
Sample Date	2006-07-25	2006-07-25	2006-07-25
Units	mg/kg DW	mg/kg DW	mg/kg DW
Concentrations are reported per Dry Weight			
1,1,1-trichlorethane	<0.005	<0.005	<0.005
1,2,3-trichloropropane	<0.005	<0.005	<0.005
Tetrachloromethane	<0.005	<0.005	<0.005
1,1-dichloropropane	<0.005	<0.005	<0.005
Trichloroethene	<0.005	<0.005	<0.005
1,2-dichloropropane	<0.005	<0.005	<0.005
Dibrommethane	<0.005	<0.005	<0.005
Bromchloromethane	<0.005	<0.005	<0.005
Bromodichloromethane	<0.005	<0.005	<0.005
Hexachlorobutadien	<0.005	<0.005	<0.005
1,3-Dichloropropene	<0.005	<0.005	<0.005
Group 2 Extractive compounds			
Aliphatics >C5-C8	< 5	< 5	< 5
Aliphatics >C8-C10	< 5	< 5	< 5
Aliphatics >C10-C12	<5	<5	<5
Aliphatics >C12-C16	<5	<5	<5
Aliphatics >C16-C35	<10	<10	<10
Aromatics >C8-C10	<5	< 10	< 10
Aromatics >C10-C35	<10	<10	<10
Poly Chlorinated Biphenyls PCBs			
2,4,4'-Trichlorobiphenyl	<0.10	<0.10	<0.10
2,2',5,5'-Tetrachlorobiphenyl	<0.10	<0.10	<0.10
2,2',4,5,5'-Pentachlorobiphenyl	<0.10	<0.10	<0.10
2,3',4,4',5'-Pentachlorobiphenyl	<0.10	<0.10	<0.10
2,4,5,2',4',5'-Hexachlorobiphenyl	<0.10	<0.10	<0.10
2,2',3,4,4',5'-Hexachlorobiphenyl	<0.10	<0.10	<0.10
2,2',3,4,4',5,5'-Heptachlorobiphenyl	<0.10	<0.10	<0.10
Group 3 Phenols and Cresols			
Phenol	<1.00	<1.00	<1.00
m-cresol	<1.00	<1.00	<1.00
o-cresol	<1.00	<1.00	<1.00
p-cresol	<1.00	<1.00	<1.00
2,3-dimethylphenol	<1.00	<1.00	<1.00
3,4-dimethylphenol	<1.00	<1.00	<1.00
2,6-dimethylphenol	<1.00	<1.00	<1.00
Sum dichlorophenol	<1.00	<1.0	<1.0
Sum trichlorophenol	<1.00	<1.0	<1.0
Sum tetrachlorophenol	<1.00	<1.0	<1.0
Chlorophenol	<1.00	<1.0	<1.0
Sum cresols	<3.0	<3.0	<3.0

Sampling person	MS	MS	MS
Sample Point	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo
Sample	A014373-06	A014374-06	A014375-06
Sample name	44-13	44-15	44-17
Sample depth	1,3-1,4	0,5-0,6	0,7-0,8
Sampling method			
Sample Date	2006-07-25	2006-07-25	2006-07-25
Units	mg/kg DW	mg/kg DW	mg/kg DW
Concentrations are reported per Dry Weight			
1,1,1-trichlorethane	<0.005	<0.005	<0.005
1,2,3-trichloropropane	<0.005	<0.005	<0.005
Tetrachloromethane	<0.005	<0.005	<0.005
1,1-dichloropropane	<0.005	<0.005	<0.005
Trichloroethene	<0.005	<0.005	<0.005
1,2-dichloropropane	<0.005	<0.005	<0.005
Dibrommethane	<0.005	<0.005	<0.005
Bromchloromethane	<0.005	<0.005	<0.005
Bromodichloromethane	<0.005	<0.005	<0.005
Hexachlorobutadien	<0.005	<0.005	<0.005
1,3-Dichloropropene	<0.005	<0.005	<0.005
Group 2 Extractive compounds			
Aliphatics >C5-C8	< 5	< 5	< 5
Aliphatics >C8-C10	< 5	< 5	< 5
Aliphatics >C10-C12	<5	<5	<5
Aliphatics >C12-C16	<5	<5	<5
Aliphatics >C16-C35	310	<10	<10
Aromatics >C8-C10	< 10	< 10	< 10
Aromatics >C10-C35	<10	<10	<10
Poly Chlorinated Biphenyls PCBs			
2,4,4'-Trichlorobiphenyl	<0.10	<0.10	<0.10
2,2',5,5'-Tetrachlorobiphenyl	<0.10	<0.10	<0.10
2,2',4,5,5'-Pentachlorobiphenyl	<0.10	<0.10	<0.10
2,3',4,4',5'-Pentachlorobiphenyl	<0.10	<0.10	<0.10
2,4,5,2',4',5'-Hexachlorobiphenyl	<0.10	<0.10	<0.10
2,2',3,4,4',5'-Hexachlorobiphenyl	<0.10	<0.10	<0.10
2,2',3,4,4',5,5'-Heptachlorobiphenyl	<0.10	<0.10	<0.10
Group 3 Phenols and Cresols			
Phenol	<1.00	<1.00	<1.00
m-cresol	<1.00	<1.00	<1.00
o-cresol	<1.00	<1.00	<1.00
p-cresol	<1.00	<1.00	<1.00
2,3-dimethylphenol	<1.00	<1.00	<1.00
3,4-dimethylphenol	<1.00	<1.00	<1.00
2,6-dimethylphenol	<1.00	<1.00	<1.00
Sum dichlorophenol	<1.0	<1.0	<1.0
Sum trichlorophenol	<1.0	<1.0	<1.0
Sum tetrachlorophenol	<1.0	<1.0	<1.0
Chlorophenol	<1.0	<1.0	<1.0
Sum cresols	<3.0	<3.0	<3.0

Sampling person	MS	MS	MS
Sample Point	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo
Sample	A014376-06	A014377-06	A014378-06
Sample name	44-17	44-18	44-18
Sample depth	1,5-1,6	1,5-1,6	3,2-3,3
Sampling method			SS028150-2
Sample Date	2006-07-25	2006-07-25	2006-07-25
Units	mg/kg DW	mg/kg DW	mg/kg DW
Concentrations are reported per Dry Weight			
1,1,1-trichlorethane	<0.005	<0.005	<0.005
1,2,3-trichloropropane	<0.005	<0.005	<0.005
Tetrachloromethane	<0.005	<0.005	<0.005
1,1-dichloropropane	<0.005	<0.005	<0.005
Trichloroethene	<0.005	<0.005	<0.005
1,2-dichloropropane	<0.005	<0.005	<0.005
Dibrommethane	<0.005	<0.005	<0.005
Bromchloromethane	<0.005	<0.005	<0.005
Bromodichloromethane	<0.005	<0.005	<0.005
Hexachlorobutadien	<0.005	<0.005	<0.005
1,3-Dichloropropene	<0.005	<0.005	<0.005
Group 2 Extractive compounds			
Aliphatics >C5-C8	< 5	< 5	< 5
Aliphatics >C8-C10	< 5	< 5	< 5
Aliphatics >C10-C12	<5	<5	14
Aliphatics >C12-C16	<5	<5	88
Aliphatics >C16-C35	140	20	790
Aromatics >C8-C10	< 10	< 10	15
Aromatics >C10-C35	<10	<10	280
Poly Chlorinated Biphenyls PCBs			
2,4,4'-Trichlorobiphenyl	<0.10	<0.10	<0.10
2,2',5,5'-Tetrachlorobiphenyl	<0.10	<0.10	<0.10
2,2',4,5,5'-Pentachlorobiphenyl	<0.10	<0.10	<0.10
2,3',4,4',5'-Pentachlorobiphenyl	<0.10	<0.10	<0.10
2,4,5,2',4',5'-Hexachlorobiphenyl	<0.10	<0.10	<0.10
2,2',3,4,4',5'-Hexachlorobiphenyl	<0.10	<0.10	<0.10
2,2',3,4,4',5,5'-Heptachlorobiphenyl	<0.10	<0.10	<0.10
Group 3 Phenols and Cresols			
Phenol	<1.00	<1.00	<1.00
m-cresol	<1.00	<1.00	<1.00
o-cresol	<1.00	<1.00	<1.00
p-cresol	<1.00	<1.00	<1.00
2,3-dimethylphenol	<1.00	<1.00	<1.00
3,4-dimethylphenol	<1.00	<1.00	<1.00
2,6-dimethylphenol	<1.00	<1.00	<1.00
Sum dichlorophenol	<1.00	<1.0	<1.0
Sum trichlorophenol	<1.00	<1.0	<1.0
Sum tetrachlorophenol	<1.00	<1.0	<1.0
Chlorophenol	<1.00	<1.0	<1.0
Sum cresols	<3.0	<3.0	<3.0

Sampling person	MS
Sample Point	JRK 44 Tapa Vagunidepoo
Sample	A014379-06
Sample name	44-20
Sample depth	3,0-3,2
Sampling method	SS028150-2
Sample Date	2006-07-25
Units	mg/kg DW
Concentrations are reported per Dry Weight	
1,1,1-trichlorethane	<0.005
1,2,3-trichloropropane	<0.005
Tetrachloromethane	<0.005
1,1-dichloropropane	<0.005
Trichloroethene	<0.005
1,2-dichloropropane	<0.005
Dibrommethane	<0.005
Bromchloromethane	<0.005
Bromodichloromethane	<0.005
Hexachlorobutadien	<0.005
1,3-Dichloropropene	<0.005
Group 2 Extractive compounds	
Aliphatics >C5-C8	< 5
Aliphatics >C8-C10	< 5
Aliphatics >C10-C12	19
Aliphatics >C12-C16	130
Aliphatics >C16-C35	700
Aromatics >C8-C10	<5
Aromatics >C10-C35	<10
Poly Chlorinated Biphenyls PCBs	
2,4,4'-Trichlorobiphenyl	<0.10
2,2',5,5'-Tetrachlorobiphenyl	<0.10
2,2',4,5,5'-Pentachlorobiphenyl	<0.10
2,3',4,4',5'-Pentachlorobiphenyl	<0.10
2,4,5,2',4',5'-Hexachlorobiphenyl	<0.10
2,2',3,4,4',5'-Hexachlorobiphenyl	<0.10
2,2',3,4,4',5,5'-Heptachlorobiphenyl	<0.10
Group 3 Phenols and Cresols	
Phenol	<1.00
m-cresol	<1.00
o-cresol	<1.00
p-cresol	<1.00
2,3-dimethylphenol	<1.00
3,4-dimethylphenol	<1.00
2,6-dimethylphenol	<1.00
Sum dichlorophenol	<1.0
Sum trichlorophenol	<1.0
Sum tetrachlorophenol	<1.0
Chlorophenol	<1.0
Sum cresols	<3.0

Sampling person	MS	MS	MS
Sample Point	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo
Sample	A014364-06	A014365-06	A014366-06
Sample name	44-02	44-03	44-05
Sample depth	1,4-1,6	1,2-1,3	0,8-1,0
Sampling method			
Sample Date	2006-07-24	2006-07-24	2006-07-24
Units	mg/kg DW	mg/kg DW	mg/kg DW
Concentrations are reported per Dry Weight			
Group 5 PAH			
Anthracene	4,6	<0.10	<0.10
Phenanthrene	18	<0.10	0,26
Pyrene	6,7	<0.10	0,57
Acenaphthene	5,4	<0.10	0,1
Chrysene	2,5	<0.10	0,6
Naphtalene	15	<0.10	<0.10
α-methylnaphtalene	27	<0.10	<0.10
β-methylnaphtalene	29	<0.10	<0.10
Acenaphtalene	12	<0.10	<0.10
Benzo(a)pyrene	1,5	<0.10	0,41
Benzo(a)anthracene	2,8	<0.10	0,52
Benzo(b,k)fluorantene	1,4	<0.10	0,83
Indeno(1,2,3,c,d)pyrene	0,51	<0.10	0,37
Dibenzo(a,h)anthracene	0,25	<0.10	0,12
9H-Fluorene	11	<0.10	<0.10
Fluorantene	2,7	<0.10	0,75
Benzo(g,h,i)perylene	0,63	<0.10	0,28
Dibenzofuran	0,35	<0.10	<0.10
Carbazole	<0.10	<0.10	<0.10
Sum carcinogenic PAH	9,1	<0.30	2,9
Sum other PAH	76	<0.50	2,2
Group 7 Metals			
Cadmium	1,3	0,22	0,74
Lead	8,3	22	9,1
Strontium	280	30	260
Arsenic	2,1	3,7	3,4
Copper	2,5	9,1	3,4
Chromium	7,5	36	13
Nickel	4,3	21	8,2
Zinc	200	140	240

Lantmännen Analycen AB
2006-09-07

Caroline Karlsson

Sampling person	MS	MS	MS
Sample Point	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo
Sample	A014367-06	A014368-06	A014369-06
Sample name	44-06	44-07	44-09
Sample depth	0,8-1,0	0,6-0,7	0,45-0,55
Sampling method			
Sample Date	2006-07-24	2006-07-24	2006-07-25
Units	mg/kg DW	mg/kg DW	mg/kg DW
Concentrations are reported per Dry Weight			
Group 5 PAH			
Anthracene	<0.10	<0.10	<0.10
Phenanthrene	<0.10	0,18	<0.10
Pyrene	<0.10	0,31	<0.10
Acenaphthene	<0.10	<0.10	<0.10
Chrysene	<0.10	0,23	<0.10
Naphtalene	<0.10	<0.10	<0.10
α-methylnaphtalene	<0.10	<0.10	<0.10
β-methylnaphtalene	<0.10	<0.10	<0.10
Acenaphtalene	<0.10	<0.10	<0.10
Benzo(a)pyrene	<0.10	0,16	<0.10
Benzo(a)anthracene	<0.10	0,18	<0.10
Benzo(b,k)fluorantene	<0.10	0,35	<0.10
Indeno(1,2,3,c,d)pyrene	<0.10	0,18	<0.10
Dibenzo(a,h)anthracene	<0.10	<0.10	<0.10
9H-Fluorene	<0.10	<0.10	<0.10
Fluorantene	<0.10	0,39	<0.10
Benzo(g,h,i)perylene	<0.10	0,14	<0.10
Dibenzofuran	<0.10	<0.10	<0.10
Carbazole	<0.10	<0.10	<0.10
Sum carcinogenic PAH	<0.30	1,2	<0.30
Sum other PAH	<0.50	1,2	<0.50
Group 7 Metals			
Cadmium	0,33	<0.22	<0.24
Lead	11	420	22
Strontium	340	110	160
Arsenic	3,4	3,7	<2.4
Copper	4,3	19	8,9
Chromium	14	16	14
Nickel	8,2	15	13
Zinc	120	90	37

Lantmännen Analycen AB
2006-09-07

Caroline Karlsson

Sampling person	MS	MS	MS
Sample Point	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo
Sample	A014370-06	A014371-06	A014372-06
Sample name	44-09	44-10	44-12
Sample depth	1,4-1,7	0,4-0,5	0,9-1,0
Sampling method			
Sample Date	2006-07-25	2006-07-25	2006-07-25
Units	mg/kg DW	mg/kg DW	mg/kg DW
Concentrations are reported per Dry Weight			
Group 5 PAH			
Anthracene	<0.10	<0.10	<0.10
Phenanthrene	<0.10	<0.10	<0.10
Pyrene	<0.10	<0.10	<0.10
Acenaphthene	<0.10	<0.10	<0.10
Chrysene	<0.10	<0.10	<0.10
Naphtalene	<0.10	<0.10	<0.10
α-methylnaphtalene	<0.10	<0.10	<0.10
β-methylnaphtalene	<0.10	<0.10	<0.10
Acenaphtalene	<0.10	<0.10	<0.10
Benzo(a)pyrene	<0.10	<0.10	<0.10
Benzo(a)anthracene	<0.10	<0.10	<0.10
Benzo(b,k)fluorantene	<0.10	<0.10	<0.10
Indeno(1,2,3,c,d)pyrene	<0.10	<0.10	<0.10
Dibenzo(a,h)anthracene	<0.10	<0.10	<0.10
9H-Fluorene	<0.10	<0.10	<0.10
Fluorantene	<0.10	<0.10	<0.10
Benzo(g,h,i)perylene	<0.10	<0.10	<0.10
Dibenzofuran	<0.10	<0.10	<0.10
Carbazole	<0.10	<0.10	<0.10
Sum carcinogenic PAH	<0.30	<0.30	<0.30
Sum other PAH	<0.50	<0.50	<0.50
Group 7 Metals			
Cadmium	<0.21	0,22	1,3
Lead	7	20	42
Strontium	160	20	51
Arsenic	<2.1	3,3	4,8
Copper	3,9	7,3	13
Chromium	12	21	23
Nickel	7,5	13	16
Zinc	43	87	470

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Caroline Karlsson

Sampling person	MS	MS	MS
Sample Point	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo
Sample	A014373-06	A014374-06	A014375-06
Sample name	44-13	44-15	44-17
Sample depth	1,3-1,4	0,5-0,6	0,7-0,8
Sampling method			
Sample Date	2006-07-25	2006-07-25	2006-07-25
Units	mg/kg DW	mg/kg DW	mg/kg DW
Concentrations are reported per Dry Weight			
Group 5 PAH			
Anthracene	<0.10	<0.10	<0.10
Phenanthrene	<0.10	<0.10	<0.10
Pyrene	0,11	<0.10	<0.10
Acenaphthene	<0.10	<0.10	<0.10
Chrysene	<0.10	<0.10	<0.10
Naphtalene	<0.10	<0.10	<0.10
α-methylnaphtalene	<0.10	<0.10	<0.10
β-methylnaphtalene	<0.10	<0.10	<0.10
Acenaphtalene	<0.10	<0.10	<0.10
Benzo(a)pyrene	<0.10	<0.10	<0.10
Benzo(a)anthracene	<0.10	<0.10	<0.10
Benzo(b,k)fluorantene	0,13	<0.10	<0.10
Indeno(1,2,3,c,d)pyrene	<0.10	<0.10	<0.10
Dibenzo(a,h)anthracene	<0.10	<0.10	<0.10
9H-Fluorene	<0.10	<0.10	<0.10
Fluorantene	<0.10	<0.10	<0.10
Benzo(g,h,i)perylene	<0.10	<0.10	<0.10
Dibenzofuran	<0.10	<0.10	<0.10
Carbazole	<0.10	<0.10	<0.10
Sum carcinogenic PAH	0,37	<0.30	<0.30
Sum other PAH	<0.50	<0.50	<0.50
Group 7 Metals			
Cadmium	1,7	0,53	0,3
Lead	13	15	35
Strontium	340	15	33
Arsenic	<2.1	4	<2.2
Copper	5,8	5,3	12
Chromium	5,6	20	16
Nickel	2,7	11	10
Zinc	190	140	160

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Caroline Karlsson

Sampling person	MS	MS	MS
Sample Point	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo
Sample	A014376-06	A014377-06	A014378-06
Sample name	44-17	44-18	44-18
Sample depth	1,5-1,6	1,5-1,6	3,2-3,3
Sampling method			SS028150-2
Sample Date	2006-07-25	2006-07-25	2006-07-25
Units	mg/kg DW	mg/kg DW	mg/kg DW
Concentrations are reported per Dry Weight			
Group 5 PAH			
Anthracene	<0.10	<0.10	2,7
Phenanthrene	<0.10	<0.10	22
Pyrene	<0.10	0,27	5,3
Acenaphthene	<0.10	<0.10	5,2
Chrysene	<0.10	0,36	2
Naphtalene	<0.10	<0.10	67
α-methylnaphtalene	<0.10	<0.10	47
β-methylnaphtalene	<0.10	<0.10	65
Acenaphtalene	<0.10	<0.10	5,4
Benzo(a)pyrene	<0.10	0,27	0,72
Benzo(a)anthracene	<0.10	0,28	1,5
Benzo(b,k)fluorantene	<0.10	0,6	0,72
Indeno(1,2,3,c,d)pyrene	<0.10	0,18	0,22
Dibenzo(a,h)anthracene	<0.10	<0.10	0,14
9H-Fluorene	<0.10	<0.10	12
Fluorantene	<0.10	0,27	2,2
Benzo(g,h,i)perylene	<0.10	0,18	0,29
Dibenzofuran	<0.10	<0.10	0,5
Carbazole	<0.10	<0.10	<0.10
Sum carcinogenic PAH	<0.30	1,7	5,3
Sum other PAH	<0.50	1	120
Group 7 Metals			
Cadmium	0,69	0,36	<0.20
Lead	9,1	56	26
Strontium	240	210	490
Arsenic	<2.2	4,1	<2.0
Copper	4,7	14	7,2
Chromium	11	13	3,8
Nickel	7	7,9	1,2
Zinc	210	120	37

Lantmännen Analycen AB
2006-09-07

Caroline Karlsson

Sampling person	MS
Sample Point	JRK 44 Tapa Vagunidepoo
Sample	A014379-06
Sample name	44-20
Sample depth	3,0-3,2
Sampling method	SS028150-2
Sample Date	2006-07-25
Units	mg/kg DW
Concentrations are reported per Dry Weight	

Group 5 PAH

Anthracene	<0.10
Phenanthrene	0,19
Pyrene	0,28
Acenaphthene	<0.10
Chrysene	0,3
Naphtalene	2,7
α-methylnaphtalene	<0.10
β-methylnaphtalene	<0.10
Acenaphtalene	<0.10
Benzo(a)pyrene	<0.10
Benzo(a)anthracene	<0.10
Benzo(b,k)fluorantene	<0.10
Indeno(1,2,3,c,d)pyrene	<0.10
Dibenzo(a,h)anthracene	<0.10
9H-Fluorene	0,27
Fluorantene	<0.10
Benzo(g,h,i)perylene	<0.10
Dibenzofuran	<0.10
Carbazole	<0.10
Sum carcinogenic PAH	0,52
Sum other PAH	3,8

Group 7 Metals

Cadmium	<0.20
Lead	5,3
Strontium	280
Arsenic	<2.0
Copper	3
Chromium	4,2
Nickel	1,3
Zinc	15

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Caroline Karlsson

Sampling person		Mati Salu	Mati Salu	Mati Salu	Mati Salu
Sample Point		JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo
Sample		V020063-06	V020064-06	V020065-06	V020066-06
Sample name		44-21	44-22	44-drill well of Valgejõe 4	44-drill well of Põllu 13
Sample depth					
Sampling method			A209:35	A209:34	A209:34
Sample Date		2006-07-28	2006-07-28	2006-07-28	2006-07-28
Concentrations are reported per Dry Weight					
Group 1 Volatile Organic Compounds					
	Units				
Benzene	µg/l	9	<0.2	<0.2	<0.2
Toluene	µg/l	12	6	<1	<1
Xylene	mg/l	0,002	0,022	<0.001	<0.001
Ethylbenzene	µg/l	<1	6	<1	<1
Sum TEX	mg/l	0,014	0,028	<0.001	<0.001
Styrene	µg/l	<1	<1	<1	<1
MTBE	µg/l	<0.01	<0.01	<0.01	<0.01
Chloroorganic aromatics					
Chlorobenzene	µg/l	<1	<1	<1	<1
2-Chlorotoluene	µg/l	<1	<1	<1	<1
4-Chlorotoluene	µg/l	<1	<1	<1	<1
1,3-dichlorobenzene	µg/l	<1	<1	<1	<1
1,4-dichlorobenzene	µg/l	<1	<1	<1	<1
1,2-dichlorobenzene	µg/l	<1	<1	<1	<1
1,2,4-trichlorobenzene	µg/l	<1	<1	<1	<1
1,2,3-trichlorobenzene	µg/l	<1	<1	<1	<1
1,2-dichloroethane	µg/l	<1	<1	<1	<1
Hexachloroethane	µg/l	<0.10	<0.10	<0.10	<0.10
Chloroform	µg/l	<1	<1	<1	<1
Auxiliary volatile organic compunds					
Isopropylbenzene	µg/l	<1	8	<1	<1
Propylbenzene	µg/l	<1	2	<1	<1
1,3,5-trimetylbenzene	µg/l	<1	2	<1	<1
Tert-butylbenzene	µg/l	<1	3	<1	<1
1,2,4-trimetylbenzene	µg/l	<1	4	<1	<1
Sec-butylbenzene	µg/l	<1	4	<1	<1
p-isopropylbenzene	µg/l	<1	18	<1	<1
Butylbenzene	µg/l	<1	7	<1	<1
Fluortrichloromethane	µg/l	<1	<1	<1	<1
1,1,2-trichloroethane	µg/l	<1	<1	<1	<1
1,1-dichloroethene	µg/l	<1	<1	<1	<1
1,1,1,2-Tetrachloroethane	µg/l	<1	<1	<1	<1
Tetrachloroethene	µg/l	<1	<1	<1	<1
Dichloromethane	µg/l	<1	<1	<1	<1
1,3-dichloropropane	µg/l	<1	<1	<1	<1
Trans-1,2-dichloroethene	µg/l	<1	<1	<1	<1
Dibromchloromethane	µg/l	<1	<1	<1	<1
1,1-dichloroethane	µg/l	<1	<1	<1	<1
1,2-dibromoethane	µg/l	<1	<1	<1	<1
2,2-dichloropropane	µg/l	<1	<1	<1	<1
Cis-1,2-dichloroethene	µg/l	<1	<1	<1	<1
Bromoform	µg/l	<1	<1	<1	<1
Bromobenzene	µg/l	<1	<1	<1	<1

Sampling person		Mati Salu	Mati Salu	Mati Salu	Mati Salu
Sample Point		JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo
Sample		V020063-06	V020064-06	V020065-06	V020066-06
Sample name		44-21	44-22	44-drill well of Valgejõe 4	44-drill well of Põllu 13
Sample depth					
Sampling method			A209:35	A209:34	A209:34
Sample Date		2006-07-28	2006-07-28	2006-07-28	2006-07-28
Concentrations are reported per Dry Weight					
	Units				
1,1,1-trichlorethane	µg/l	<1	<1	<1	<1
1,2,3-trichloropropane	µg/l	<1	<1	<1	<1
Tetrachloromethane	µg/l	<1	<1	<1	<1
1,1-dichloropropane	µg/l	<1	<1	<1	<1
Trichloroethene	µg/l	<1	<1	<1	<1
1,2-dichloropropane	µg/l	<1	<1	<1	<1
Dibrommethane	µg/l	<1	<1	<1	<1
Bromchloromethane	µg/l	<1	<1	<1	<1
Bromodichloromethane	µg/l	<1	<1	<1	<1
Hexachlorobutadien	µg/l	<1	<1	<1	<1
1,3-Dichloropropene	µg/l	<1	<1	<1	<1
Group 2 Extractive compounds					
Aliphatics >C5-C8	mg/l	<0.02	<0.02	<0.02	<0.02
Aliphatics >C8-C10	mg/l	<0.02	<0.02	<0.02	<0.02
Aliphatics >C10-C12	mg/l	<0.02	0,66	<0.02	<0.02
Aliphatics >C12-C16	mg/l	0,03	5,9	<0.02	<0.02
Aliphatics >C16-C35	mg/l	0,35	77	<0.05	<0.05
Aromatics >C8-C10	mg/l	<0.1	<0.1	<0.1	<0.1
Aromatics >C10-C35	mg/l	<0.1	311	<0.1	<0.1
Poly Chlorinated Biphenyls PCBs					
2,4,4'-Trichlorobiphenyl	µg/l	<0.10	<0.10	<0.10	<0.10
2,2',5,5'-Tetrachlorobiphenyl	µg/l	<0.10	<0.10	<0.10	<0.10
2,2',4,5,5'-Pentachlorobiphenyl	µg/l	<0.10	<0.10	<0.10	<0.10
2,3',4,4',5'-Pentachlorobiphenyl	µg/l	<0.10	<0.10	<0.10	<0.10
2,4,5,2',4',5'-Hexachlorobiphenyl	µg/l	<0.10	<0.10	<0.10	<0.10
2,2',3,4,4',5'-Hexachlorobiphenyl	µg/l	<0.10	<0.10	<0.10	<0.10
2,2',3,4,4',5,5'-Heptachlorobiphenyl	µg/l	<0.10	<0.10	<0.10	<0.10
Group 3 Phenols and Cresols					
Phenol	µg/l	<1.00	<1.00	<1.00	<1.00
m-cresol	µg/l	<1.00	<1.00	<1.00	<1.00
o-cresol	µg/l	<1.00	<1.00	<1.00	<1.00
p-cresol	µg/l	<1.00	<1.00	<1.00	<1.00
2,3-dimethylphenol	µg/l	<1.00	<1.00	<1.00	<1.00
3,4-dimethylphenol	µg/l	<1.00	<1.00	<1.00	<1.00
2,6-dimethylphenol	µg/l	<1.00	<1.00	<1.00	<1.00
Sum dichlorophenol	µg/l	<1.0	<1.0	<1.0	<1.0
Sum trichlorophenol	µg/l	<1.0	<1.0	<1.0	<1.0
Sum tetrachlorophenol	µg/l	<1.0	<1.0	<1.0	<1.0
Chlorophenol	µg/l	<1.0	<1.0	<1.0	<1.0
Sum cresols	µg/l	<3.0	<3.0	<3.0	<3.0

Sampling person		Mati Salu	Mati Salu	Mati Salu	Mati Salu
Sample Point		JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo	JRK 44 Tapa Vagunidepoo
Sample		V020063-06	V020064-06	V020065-06	V020066-06
Sample name		44-21	44-22	44-drill well of Valgejõe 4	44-drill well of Põllu 13
Sample depth					
Sampling method			A209:35	A209:34	A209:34
Sample Date		2006-07-28	2006-07-28	2006-07-28	2006-07-28
Concentrations are reported per Dry Weight					
	Units				
Group 5 PAH					
	Units				
Anthracene	µg/l	0,38	9	<0.10	<0.10
Phenanthrene	µg/l	0,84	16	<0.10	<0.10
Pyrene	µg/l	1,55	5	<0.10	<0.10
Acenaphthene	µg/l	<0.10	7	<0.10	<0.10
Chrysene	µg/l	0,37	30	<0.10	<0.10
Naphtalene	µg/l	<0.10	4	<0.10	<0.10
α-methylnaphtalene	µg/l	<0.10	5	<0.10	<0.10
β-methylnaphtalene	µg/l	<0.10	1	<0.10	<0.10
Acenaphtalene	µg/l	0,13	1	<0.10	<0.10
Benzo(a)pyrene	µg/l	0,1	7	<0.10	<0.10
Benzo(a)anthracene	µg/l	0,21	9	<0.10	<0.10
Benzo(b,k)fluorantene	µg/l	0,15	4	<0.10	<0.10
Indeno(1,2,3,c,d)pyrene	µg/l	<0.10	1	<0.10	<0.10
Dibenzo(a,h)anthracene	µg/l	<0.10	1	<0.10	<0.10
9H-Fluorene	µg/l	0,11	10	<0.10	<0.10
Fluorantene	µg/l	0,54	7	<0.10	<0.10
Benzo(g,h,i)perylene	µg/l	<0.10	1	<0.10	<0.10
Dibenzofuran	µg/l	<0.10	1	<0.10	<0.10
Carbazole	µg/l	<0.10	5	<0.10	<0.10
Sum carcinogenic PAH	µg/l	0,73	45	<0.30	<0.30
Sum other PAH	µg/l	3,6	60	<0.50	<0.50
Group 7 Metals					
Cadmium	mg/l	<0.00002	0,0016	0,000062	0,000048
Lead	mg/l	<0.00005	0,13	<0.00005	<0.00005
Strontium	mg/l	0,23	0,25	0,16	0,21
Arsenic	mg/l	0,00035	0,0053	0,00021	0,00026
Copper	mg/l	<0.0002	0,0055	0,0038	0,0026
Chromium	mg/l	<0.0002	0,0011	<0.0002	<0.0002
Nickel	mg/l	0,00086	0,0062	0,001	<0.0002
Zinc	mg/l	0,01	0,26	0,13	0,014

Lantmännen Analycen AB
2006-10-31

Caroline Karlsson

Maximum Limits for Dangerous Substances in Soil and Groundwater

Regulation of the Minister of the Environment No. 12 of 2 April 2004
(RTL 2004, 40, 662),
entered into force 19 April 2004.

This Regulation is established pursuant to § 12 of the "Chemicals Act" (RT I 1998, 47, 697; 1999, 45, 512; 2002, 53, 336; 61, 375; 63, 387; 2003, 23, 144; 51, 352; 75, 499; 88, 591).

I. General Provisions

§ 1. Maximum limits for dangerous substances

(1) The maximum limits for dangerous substances serve as the basis for assessing the condition of soil and groundwater and for planning measures necessary to improve the condition of soil and groundwater.

(2) For the purposes of this Regulation, the maximum limits for dangerous substances are expressed as reference values and target values for these substances. The reference values for dangerous substances in soil are expressed in micrograms per dry mass of soil.

§ 2. Reference value

(1) A reference value is the concentration of a dangerous substance in soil or groundwater above which the soil or groundwater is polluted and dangerous to human health and the environment.

(2) The reference value for a group of dangerous substances is the total of the reference values for the individual substances in the group, unless determined otherwise.

(3) The concentration of dangerous substances for which reference values are not established by this Regulation shall be assessed on the basis of expert assessments of the condition of soil and groundwater. An expert assessment shall be conducted if previous use of the area under assessment has created a risk of contamination from such dangerous substances.

(4) Depending on the purpose of land use, this Regulation shall implement different reference values for industrial and residential zones. The purpose of land use shall be determined based on Government of the Republic Regulation No. 36 of 24 January 1995 "Approval of the Intended Purposes of Cadastral Units and of the Bases of their Designation" (RT I 1995, 13, 150; 1996, 32, 636).

(5) For the purposes of this Regulation, the following are industrial zones:

1) land used for production facilities, except cold storages, grain storages, vegetable storages and warehouse complexes;
2) land used for repair shops for agricultural machinery and forging shops that belong to agricultural production facilities;
3) land used for mining;
4) land used for landfills;
5) land used for transportation;
6) national defence land, except land under and needed to service buildings used for accommodation and rendering services to people;
7) polluted technogenic soil and other wasteland resulting from human activity, which is not designated for a specific purpose;
8) commercial land used for petrol stations;
9) land used for mass communication networks and utility works;

(6) The categories of land use not listed in subsection (5) belong to residential zones.

(7) The suitability of groundwater as a source of potable water cannot be determined on the basis of the reference values set out in this Regulation.

§ 3. Target value

A target value is a concentration of a dangerous substance in soil or groundwater at or below which the condition of the soil or groundwater is good, that is, safe for humans and the environment.

§ 4. Satisfactory condition of soil or groundwater

The condition of soil or groundwater is satisfactory if the concentration of dangerous substances is between the reference values and target values for soil or groundwater.

II. Maximum limits of dangerous substances in soil and groundwater

No	Dangerous substance	CAS No.	Maximum limits				
			In soil, (mg/kg)			In groundwater, µg/l	
			Target value	Reference value in residential zone	Reference value in industrial zone	Target value	Reference value
I. Heavy metals							
1.	Mercury (Hg)	–	0,5	2	10	0,4	2
2.	Cadmium (Cd)	–	1	5	20	1	10
3.	Lead (Pb)	–	50	300	600	10	200
4.	Zinc (Zn)	–	200	500	1500	50	5000
5.	Nickel (Ni)	–	50	150	500	10	200
6.	Chromium (Cr)	–	100	300	800	10	200
7.	Copper (Cu)	–	100	150	500	15	1000
8.	Cobalt (Co)	–	20	50	300	5	300
9.	Molybdenum (Mo)	–	10	20	200	5	70
10.	Tin (Sn)	–	10	50	300	3	150
11.	Barium (Ba)	–	500	750	2000	50	7000
12.	Selenium (Se)	–	1	5	20	5	50
13.	Vanadium (V)	–	50	300	1000	–	–
14.	Antimony (Sb)	–	10	20	100	–	–
15.	Thallium (Tl)	–	1	5	20	–	–
16.	Beryllium (Be)	–	2	10	50	–	–
17.	Uranium (U)	–	20	50	500	–	–
II. Other inorganic compounds							
18.	Fluoride (as F-ion, total)	–	450	1200	2000	1500	4000
19.	Arsenic (As)	–	20	30	50	5	100
20.	Boron (B)	–	30	100	500	500	2000
21.	Cyanides (as CN-ion, free)	–	1	10	100	5	100
22.	Cyanides (CN-total)	–	5	50	500	100	200
III. Aromatic hydrocarbons							
23.	Benzene	71-43-2	0,05	0,5	5	0,2	5
24.	Ethylbenzene	100-41-4	0,1	5	50	0,5	50
25.	Toluene	108-88-3	0,1	3	100	0,5	50
26.	Styrene	100-42-5	1	5	50	0,5	50
27.	Xylenols	–	0,1	5	30	0,5	30
28.	Aromatic hydrocarbons (total)	–	1	10	100	1	100
29.	Monophenols (total concentration of cresols and dimethyl phenols)	–	1	10	100	1	100
30.	Biphenols (total concentration of pyrocatechol, resorcinol and hydroquinone)	–	1	10	100	1	100

No	Dangerous substance	CAS No.	Maximum limits				
			In soil, (mg/kg)			In groundwater, µg/l	
			Target value	Reference value in residential zone	Reference value in industrial zone	Target value	Reference value
31.	Phenols (each following compound)		0,1	1	10	0,5	50
	o-cresol	95-48-7					
	m-cresol	108-39-4					
	p-cresol	106-44-5					
	2.3-dimethyl phenol	526-75-0					
	2.4-dimethyl phenol	105-67-9					
	2.5-dimethyl phenol	95-87-4					
	2.6-dimethyl phenol	576-26-1					
	3.4-dimethyl phenol	95-65-8					
	3.5-dimethyl phenol	108-68-9					
	pyrocatechol	120-80-9					
	resorcinol	108-46-3					
	beta naphthol	135-19-3					
	hydroquinome	123-31-9					
32.	Chlorophenols (each compound)	–	0,05	0,5	5	0,3	30
33.	MTBE	1634-04-4	1	5	100	0,5	10
34.	Oil products total	–	100	500	5000	20	600
IV. Polycyclic aromatic hydrocarbons (PAH)							
35.	Anthracene	120-12-7	1	5	50	0,1	5
36.	Chrysene	218-01-9	0,5	2	20	0,01	1
37.	Phenanthrene	85-01-8	1	5	50	0,05	2
38.	Naphthalene	91-20-3	1	5	100	1	50
39.	Pyrene	129-00-0	1	5	50	1	5
40.	α-methylnaphthalene	90-12-0	1	4	40	1	30
	β-methylnaphthalene	91-57-6					
41.	Dimethylnaphthalene (each following compound)		1	4	40	1	30
	1.2-dimethylnaphthalene	573-98-8					
	1.2-dimethylnaphthalene	575-41-7					
	1.4-dimethylnaphthalene	571-58-4					
	1.5-dimethylnaphthalene	571-61-9					
	1.6-dimethylnaphthalene	575-43-9					
	1.7-dimethylnaphthalene	575-37-1					
	1.8-dimethylnaphthalene	569-41-5					
	2.3-dimethylnaphthalene	581-40-8					
	2.6-dimethylnaphthalene	581-42-0					
	2.7-dimethylnaphthalene	582-16-1					

No	Dangerous substance	CAS No.	Maximum limits				
			In soil, (mg/kg)			In groundwater, µg/l	
			Target value	Reference value in residential zone	Reference value in industrial zone	Target value	Reference value
42.	Acenaphtene	83-32-9	1	4	40	1	30
43.	Benzo(a)pyrene	50-32-8	0,1	1	10	0,01	1
44.	PAH (total)	–	5	20	200	0,2	10
V. Chlorinated aliphatic hydrocarbons							
45.	1.2-dichloroethane	107-06-2	0,1	2	50	0,1	5
46.	Chloroform	67-66-3	0,1	1	25	0,1	2
47.	Hexachloroethane	67-72-1	1	10	100	1	10
48.	Chlorinated aliphatic hydrocarbons, each compound, except the compounds in this list		0,1	5	50	1	70
VI. Chlorinated aromatic hydrocarbons							
49.	PCB	1336-36-3	0,1	5	10	0,5	1
50.	Chlororganic aromatic compounds (each compound, except the compounds in this list)	–	0,1	0,5	30	0,1	5
51.	Chlororganic aromatic compounds (total)	–	0,2	5	100	0,5	5
VII. Amines							
52.	Aliphatic amines (total)	–	50	300	700	1	20
VIII. Pesticides							
53.	2.4-D	94-75-7	0,05	0,5	2	0,05	1
54.	Aldrin	309-00-2	0,1	1	5	0,01	1
55.	Dieldrin	60-57-1	0,05	0,5	2	0,01	1
56.	Endrin	72-20-8	0,1	1	5	0,005	0,5
57.	Isodrin	465-73-6	0,1	1	5	0,005	0,5
58.	DDT	50-29-3	0,1	0,5	5	0,1	1
59.	Hexachlorocyclohexane (each isomer)	–	0,05	0,2	2	0,01	1
60.	Trichlorobenzene	–	2	5	50	0,01	5
61.	Hexachlorobenzene	118-74-1	2	5	25	0,5	5
62.	Pesticides (total)	–	0,5	5	20	0,5	5

Photo 1 Underground ferroconcrete tank (50 tons) is covered with concrete plates

Photo 2 Two a´180 tons tanks

Photo 3 Inside steel barrier remained black oil and shale oil residuals

Photo 4 Two a´180 tons tanks and old pumping house with one 60 tons tank in cellar

Photo 5 Collected oily water flotation installations