

http://ymparistonc.edelkey.net/en-US/Consumption_and_production/Contaminated_soil_sites

Contaminated land in Finland – Report 2013

Reports of the Finnish Environment Institute 27/2013
Outi Pyy, Teija Haavisto, Kaisa Niskala ja Matti Silvola

Summary

Soil contamination has been studied in Finland since the 1980s. After the completion of the SAMASE project in 1994, a total of 10,400 land areas had been entered in a register as suspected or confirmed cases of contamination. By 2013, the number of such sites, some of which have already been remediated, had more than doubled to 23,850. This figure continues to rise, mainly as a result of sector-specific surveys. Investigations are currently under way to study environmental contamination caused by fire drill areas and waste areas used by the extractive industry. Most of these sites too were contaminated years ago. New contaminated areas are created when oil and chemical accidents occur and when waste management is neglected, but their number is limited and the area affected is usually small.

Fuel distribution is or has been practised on a third of all MATTI sites. The next most common sectors are landfills and the servicing and repair of motor vehicles. Sector breakdowns describe the number of locations and, to a large extent, the focus areas of the survey, not the extent and nature of the soil contamination problem. Large-scale soil contamination occurs in industrial, storage and mining areas, as well as on shooting ranges. On the other hand, minor sites, such as dry cleaners, metal finishing facilities or salt impregnation and creosoting facilities, may have caused widespread contamination of the environment – groundwater in particular.

The MATTI sites are concentrated in southern Finland and coastal areas, in other words areas with an abundance of industrial and business operations and the densest population. Approximately one in five of these sites are located in a classified groundwater area, one in ten in a conservation area and 20 % in a residential area or near it. A substantial proportion of the sites in groundwater areas are located on eskers in southern Finland, on the Salpausselkä I terminal moraine in particular. Most of the sites in protected areas are found in northern Finland. Because Natura 2000 sites cover around one third of the area of the Centre for Economic Development, Transport and the Environment of Lapland, environmentally valuable areas are more likely to be affected than elsewhere in the country.

Operations are continuing on one-third of these sites. In these areas, soil status should be investigated, at the latest when the operations are terminated. On one-third of the sites, operations that may have caused contamination have ended, but the status of the soil has not yet been examined. On one in ten of the sites, the soil is known on the basis of studies to contain harmful substances. In these areas, the next step is to either assess the need for clean-up or initiate remediation that has already been decided on. The rest of the sites do not require any measures at present. They do not contain significant amounts of harmful substances, or they have been remediated for their current use. Soil use is restricted on 550 sites, and some 4,000 sites are subject to restrictions on the use of the area.

In the years 1986–2012, environmental authorities issued almost 4,900 remediation decisions for contaminated land. Changes in land use or excavation and construction work have been the primary reasons for undertaking remediation. Remediation is usually related to mitigating health risks in future residential areas or classified groundwater areas. In approximately 3,000 cases, remediation measures have been carried out in residential areas or in their immediate vicinity, and in around 1,000 cases in classified groundwater areas.

Since 2007, remediation decisions and the setting of remediation objectives have been governed by the Government Decree on the Assessment of Soil Contamination and Remediation Needs (214/2007) and the related guidelines (Ministry of the Environment 2/2007). They emphasise the

importance of site-specific assessment. As part of the assessment, concentrations of harmful substances measured in the soil are compared to the guideline values specified in the Decree. Remediation objectives have almost always (in more than 90% of cases) been set on the basis of the current or future use of the area, using either the lower or higher guideline values provided by the Decree and, previously, the guideline values determined in the SAMASE project.

The sector breakdown of remediated sites differs somewhat from that of all sites. Sector-specific surveys have mainly contributed to the remediation of fuel distribution points, sawmills and impregnation facilities, as well as landfills. With respect to shooting ranges, plant nurseries and market gardens, surveys have so far not led to a significant number of follow-up measures.

Remediation of contaminated land is usually carried out by removing soil and depositing it off site (*ex situ*). *In situ* remediation is annually initiated on only 10–15 sites. Examples of remediation techniques used on site were containment, soil vapour extraction, biological methods and chemical oxidation.

The annual amount of excavated contaminated soils sent for treatment in landfills and other facilities comes close to 1.5 million tonnes. Of this, approximately 10% is categorised as hazardous waste. In almost 40% of excavated soils, concentrations of harmful substances exceed the higher guideline value but not the limit for hazardous waste. In around 50% of soils, concentrations of harmful substances fall between the threshold value and the higher guideline value. Of the total soil volume, 70% is contaminated with organic compounds, 10–20% with metals and the rest with mixtures of contaminants.

The reuse rate of contaminated soils has been high, 70–80%. Almost half of the soils transported to treatment facilities were used without treatment, as landfill cover material or in landfill structures. Most of the remaining treated soils were also taken to landfills, either for reuse or disposal as waste. These soils were slightly contaminated, i.e. below the higher guideline value or the SAMASE threshold value. So far, little use has been made of soils outside landfills and the original sites.

The majority of the recipients of contaminated soils are landfills. There are also a few treatment plants specialising in contaminated soils as well as composting fields and intermediate storage areas. On the basis of the environmental permits granted to treatment plants for contaminated soils, the annual reception capacity of 56 plants was more than 2.4 million tonnes in 2008. This is almost double the total amount of excavated contaminated soils. Ten major treatment plants are allowed to treat over 100,000 tonnes a year. The environmental permits of landfills and treatment plants often permit treatment methods that are not actually used due to their high cost and the resulting low demand. The operations of reception facilities and the selection of treatment methods for contaminated soils are largely guided by financial factors.

The largest reception facilities are located in southern and western Finland. Elsewhere, facilities have small capacities and mainly accept soils with low concentrations of harmful substances. For example, soil masses with multiple contaminants exceeding the higher guideline value may have to be transported hundreds of kilometres.

Remediation has been supported through two national remediation programmes. By the end of 2012, a total of 370 remediation projects had been completed through the state waste management work system. Their cost was approximately €68 million, of which €30 million was funded from the state budget. The costs of investigating 715 and remediating 360 former points of distribution contaminated with oil (SOILI sites) were paid from the Finnish Oil Pollution Compensation Fund. These costs amounted to €21 million. Funds are accumulated by collecting oil protection fees from companies that import oil to Finland.

If the surveys on soil contamination and remediation activities continue to progress at the current pace, assessment of the rate of contamination of around 20,000 MATTI sites and remediation of the necessary areas will take one hundred years, i.e. be completed in the 2120s. According to a preliminary estimate, remediation is needed on some 11,000 sites. The total costs of investigations and remediation are expected to rise as high as €4 billion. Most of this will have to be paid by those responsible for contamination and the holders of the areas. Private parties have so far remediated around 60% of the sites, while local governments and the state have been responsible for the rest.