

Semi-mobile installation for the destruction of toxic waste - Safe disposal of obsolete pesticides -

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Introduction

Under PHARE Project Nr. PL9608.02.01 "Supply, installation and commissioning of semi-mobile high-temperature incinerator for hazardous waste - Destruction of toxic waste" a semi-mobile hazardous waste incinerator has been purchased by Poland using the European Union's funds. The main goal of the project and the investment is to incinerate obsolete and expired pesticides and other pesticide waste, including contaminated soil stored throughout the country. Bids, submitted by specialised companies from different countries, were reviewed by the National Fund for Environmental Protection and Water Management in Warsaw and the supplier was selected at the end of 1999. The Austrian company SEILER Hochtemperatur Trennanlagen from Baden won the tender. The Minister of Environmental Protection is the primary owner of the installation and the Institute of Plant Protection becomes its beneficiary. The Institute is responsible for the operation of the incinerator, as well as record keeping, acquisition, transport and preparation of pesticide waste and other materials for incineration. The installation constructed by SEILER is semi-mobile, which means that it can be disassembled and transferred to a different location. According to the terms agreed to by the investor, the Polish party is financially responsible for the preparation of incineration sites and making available other necessary facilities at each site. The Institute is also charged with supervising the whole project, including obtaining the necessary permits. According to Polish building law, granting the permit follows three stages:

1. Layout of site buildings, and infrastructure - an administrative decision made by the local authorities
2. Construction permit
3. Operation permit

Each of the stages requires extensive documentation, which is then reviewed in detail by different departments and offices. The review process is very long and tedious. The procedure for the semi-mobile incinerator started in the beginning of 2000 and has continued ever since. The lengthiness of the administrative review is accompanied by negative social responses expressing discontent with the site of the installation. Out of four different locations two have already been rejected due to severe protests. The town of Choszczno in the northwestern part of Poland is currently being considered as a possible site, however social disapproval has been voiced there as well.

The incinerator has already been constructed and transported to Poland. We now await the construction permit.

The incinerator was designed according to the EU Directive No. 94/67/EC concerning incineration of hazardous wastes as well as in accordance with Polish laws and regulations.

Technological description

Characteristics of waste for incineration

The basic waste group intended for incineration is waste and expired pesticides, stored at tombs and warehouses. Due to poor conditions of most of the tombs, the contaminated soil surrounding them needs to be dealt with, and its amount is hard to calculate. It is estimated that most of the contaminated soil will be "neutralised" through incineration together with other waste.

Substances containing mercury will not be fed to the incinerator. Burning them would require installation of additional emission control devices. They will be installed at a later stage of incinerator's operation. Waste from leaking tombs will be burned first, since it poses the greatest threat to the environment.

Due to varying properties of the pesticides and their different calorific value they will amount to about 20 - 25% of the charge. The rest will be communal refuse (hazardous, if possible) or other waste collected locally.

The incinerator will be operational 300 days per year. Within this period around 400 - 450 tonnes of the most hazardous pesticides will be incinerated. Such capacity was designed taking into account technical capabilities for pesticide identification, preparation and transport to the incinerator.

Waste preparation

Waste pesticides from the tombs will be excavated and packed into tight plastic drums using special equipment owned by the Plant Protection Institute. Each drum will be labelled and recorded. Contaminated soil from around the tombs will be loaded into regular 240 l waste containers. Then waste will be transported and temporarily stored at a warehouse near the incinerator.

Filling drums and containers with waste and soil will be done at the site of their excavation. No reloading or repacking will take place in the warehouse close to the incinerator.

Figure 1 shows the most important devices and the way they are connected into a technological line.

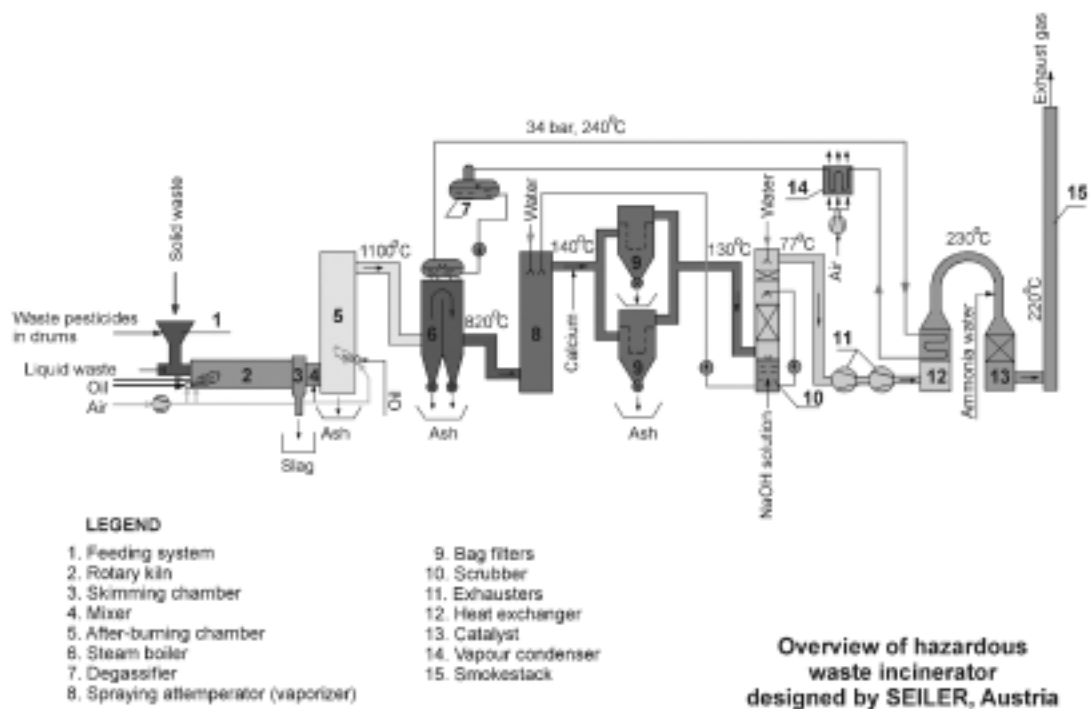


Figure 1. Semi-mobile hazardous waste incinerator

Waste incineration centre

The waste incineration centre consists of the following:

- rotary kiln
- mixer of exhaust gases and secondary air
- after-burning chamber

The rotary kiln is equipped with a double feeder. It enables to feed the kiln with solid waste through either emptying the 240 l waste containers or feeding the closed 60 l plastic drums directly (special drums for pesticide waste).

Apart from the feeder, the kiln is also equipped with an oil burner, which heats up the installation during start-up and maintains the right temperature during the operation, and a lance with a pneumatic sprayer for feeding liquid waste.

The rotary kiln has a fireproof lining and temperature of 850°C. The rotary speed of the kiln can be regulated. Exhaust gases from the kiln are directed to a chamber, where they are mixed with secondary air coming into the chamber through a nozzle system. Partial after-burning of exhaust gases takes place in the mixer where the temperature rises to ~950°C. Ashes are removed from the kiln between the rotary kiln and mixer.

Emission control system

Exhaust gases from the after-burning chamber are transferred to the emission control system that consists of the following:

- steam boiler
- spraying attemperator
- two bag filters (operating parallel)
- scrubber
- two-stage exhauster
- heat exchanger for exhaust gas heater
- catalyst chamber

The steam boiler begins to cool off emissions from the after-burning chamber. Saturated vapour that is formed in the boiler is used in the emission control system to heat up the exhaust gases in the heat exchanger before the catalyst chamber. Overheating of the boiler is prevented by the attemperator, which allows the heat to escape outside the system and where vapour is totally condensed. The emission controls do not produce any effluents, despite the fact that it is a wet system.

Process control

The major parameters controlled during operation are the temperatures in the rotary kiln and the after-burning chamber, and the composition of the exhaust gases (including the necessary content of O₂ in the emitted gases).

The installation is equipped with a system of blockades, independent of the control systems, which prevent feeding the kiln in case any of the parameters required for proper operation is not met.

The composition of exhaust gases leaving the system is constantly recorded. All substances that require controlling under both Polish and the EU regulations are measured and controlled.

If any of the parameters required for proper operation of the incinerator is not met, the system shuts down feeding the rotary kiln with waste. Procedures for restarting the system are provided by the supplier of the installation.

Technical parameters

All basic technical parameters of the incinerator are listed in Table 1.

Table 1. Technical parameters

Capacity	300 kg/h (for average calorific value of waste 24 MJ/kg)
Temperature in rotary kiln	850°C
Temperature in after-burning chamber	Min 1,100°C
Temperature of exhaust gases in stack	220°C
Usage rate of oil in burner auxiliary to rotary kiln	0÷90 kg/h
Usage rate of oil in burner auxiliary to after-burning chamber	0÷70 kg/h

Figure 2 shows the overview of the incinerator. The highest device is the steam boiler - about 13 m, stack height - 20 m. The installation with the infrastructure takes up about 0.5 ha.

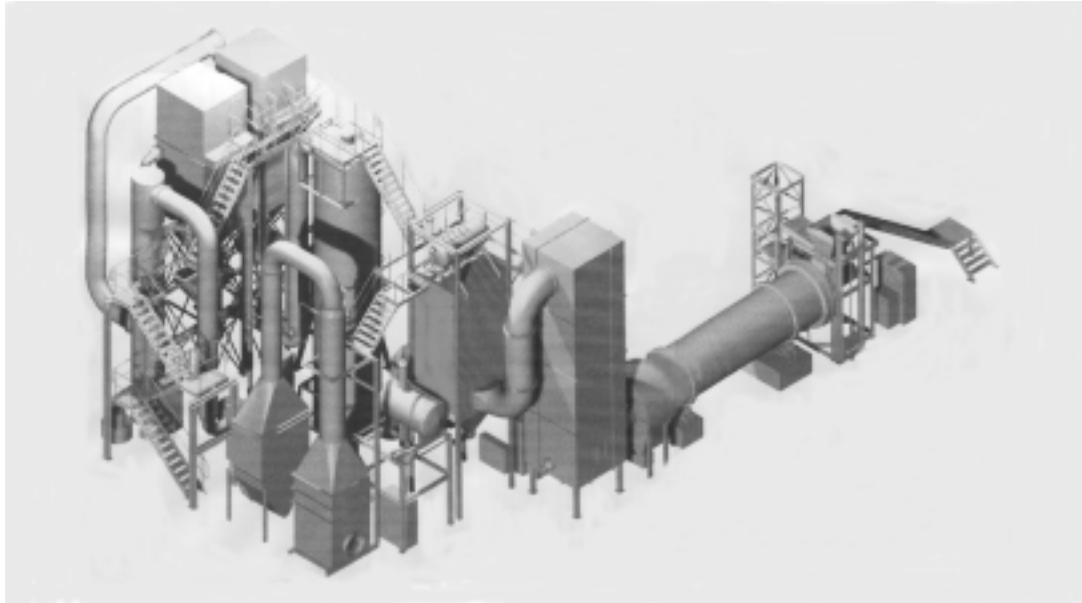


Figure 2. The overview of the incinerator

Summary

The project is ongoing and it is hard to estimate when the incinerator will be in operation. It does not eradicate the problem of obsolete pesticides in Poland, though it is helpful in dealing with waste from the most dangerous landfills in the country and other storage places close to the location of the incinerator. If incineration is successful, the installation can be used in Zachodnio-Pomorskie Province (northwestern part of Poland), where there are a lot of landfills to be disposed of.

References

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