

Case Study: Lead and Zinc Smelter

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THE REGIONAL ENVIRONMENTAL CENTER
for Central and Eastern Europe



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Lead and Zinc Smelter

Introduction

The enterprise will comprise two different sites as described below:

- Site 1 — The main production site will be located seven kilometres from the closest town and will cover an area of approximately 721,000 m². The site buildings will occupy about 106,000 m² of the total area.
- Site 2 — The disposal site for Waeltz clinker will be located adjacent to a river, about four kilometres northeast of the main site. The site will occupy an area of about 22,500 m².

Site 1: Main Production Facility

General Description

The main production site is surrounded for the most part by agricultural land. The following enterprises are located directly northwest of the main production site:

- a manufacturer for reinforced concrete building parts;
- a company producing pesticides, herbicides and fungicides;
- a research company for non-ferrous metals and semi-conductors; and
- warehouses.

In the vicinity of Site 1 there are also petrol stations, an airport and a municipal waste site.

The main site is situated on a plain in the neighbouring foothills.

The site will include:

- production facilities;
- mechanical and electrical repair shops;
- a wastewater treatment plant (located beyond the site boundary);
- a rail loading/unloading area;
- storage warehouses;
- research laboratories;

- transformer stations; and
- social facilities, administration offices and a canteen.

Production Processes

The company will start operations with the production of zinc. Lead production will be introduced later. The main products of the enterprise will be zinc and lead ingots while fulfilling very high purity standards and sulfuric acid. The projected annual capacity of the Enterprise is 40,000 tonnes of lead and 60,000 tonnes of zinc.

Lead process

Lead will be produced by the roasting-reduction method. On-site operations will include blending, sintering, smelting and refining of raw materials. The waste slag resulting from the process will be sold to the cement industry. Oxides will be passed to the zinc plant for further processing. In addition to lead, other products including copper compounds, dore alloy and bismuth will be generated. Ore will be transported to the site either by road or rail.

Zinc process

The zinc process will comprise:

- roasting of zinc sulfide concentrates;
- recovery of zinc calcine with sulfuric acid (originating from the zinc roasting process);
- processing of the non-dissolved residues (Waeltz process);
- purification of a zinc-sulfate solution and electric extraction;
- smelting of zinc cathodes; and,
- casting of zinc ingots.

Waeltz clinker resulting from the condensation process of non-dissolved zinc residues from the recovery process will be disposed of at Site 2. The sulphur dioxide gas obtained from the zinc-roasting process will be used for the production of sulfuric acid.

Site 2: Disposal Site for Waeltz clinker

General Description

The disposal site for Waeltz clinker will be located on municipal land close to a river, about four kilometres northeast of the main production site. The site is adjacent to an asphalt plant (east and southeast), abandoned agricultural land (south), a disposal site for sludge from the municipal wastewater treatment plant and a municipal landfill. It also borders an open channel that carries wastewater from the company and surrounding enterprises to the treatment plant.

Main Production Wastes

- Lead slag is expected to contain the following: Fe (32-35%), SiO₂ (28-30%), CaO (10-13%), Pb (up to 0.5%), Zn (1.5-2.0%), Cu (less than 0.2%) and As (less than 0.1%). This is a steady product, which is not water soluble and cannot be dusted. Its expected amount is up to 35,000 tonnes per annum.
- Waeltz Clinker' generates a granulated product, with hard particles not larger than 16 mm and with the following contents: Zn (up to 2%), Cu (2-2.5%), C (up to 10%) and Pb (up to 2%). Its expected amount is up to 33,000 tonnes per annum.