MAIN CHARACTERISTICS OF THE PLANT

THERMAL DESORPTION UNIT	
Annual amount treated	100,000 ton/year
Maximum treatment capacity	40 ton/hour
Average treatment capacity	30 ton/hour
Working days/year	240
Contaminated soils storage	20 days (12,000 ton)
Remediated soils storage	14 days (8,000 ton)
Average electrical energy for the process	26 kWh/ton
Average thermal energy for the process	540 kWh/ton
Air flow emission	80,000 m3/hour

INERTING UNIT	
Annual amount treated	50,000 ton/year
Average treatment capacity	14 ton/hour
Working days/year	300
Average electrical energy for the process	32 kWh/ton

GENERAL PLANT FEATURES	
Total site surface	4 ha
Covered surface	11,700 m2
Uncovered surface for machinery	2,400 m2
Personnel	19 employees

THE COMPANY

OWAC Engineering Company is located in Palermo, Via Resuttana 360, Sicily, Italy; the company has been operating in the "waste to energy" for many years and has a long time experience in the field of management consultings for the development and diversification of industrial assets. In particular the company develops its activities in the designing and building of waste treatment plants and environmental remediation.

The more relevant characteristic of OWAC's activities is the development of an idea, the designing of the system and the management of the construction works all culminating with the start-up of the initiative. Therefore OWAC is the catalyst for all the phases which bring to the final start-up of industrial plants.

The working team is very flexible, qualified and adaptable, able to develop all the required activities with care, high precision and "tailor made" solutions.
Company references and activities, both in progress and already made, are available on our website.

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OWAC
Engineering Company

CONTAMINATED SOIL TREATMENT PLANT

2018-REV:01

INTRODUCTION

The Italian territory presents various "National Interest Sites" (S.I.N.) in which environmental matrices are di usely contaminated by industrial activities with high environmental impact. So OWAC Engineering Company, in partnership with Eta Service S.r.l. which is located in Catania (Sicily, Italy), has designed an integrated plant for the treatment of contaminated soils that comes from S.I.N. (for example areas of Milazzo, Gela, Priolo, etc.), through two different sections: a thermal desorption unit and an inerting system.

THE PROJECT

The industrial complex covers an area of approximately 40,000 m2; the thermal desorption unit has a treatment capacity of about 30 ton/hour of contaminated soils and the inerting system has a capcity of 14 ton/hour of waste.

EUROPEAN WASTE CODES:
Termal desorption unit:
170106*, 170107, 170503*, 170504, 170505*, 170506, 170507*, 170508, 170801*, 170802, 170901*, 170903*, 170904.
Inerting system:
Families: 01, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 17, 18 e 19.

THE THERMAL DESORPITION PROCESS

The thermal desorption process allows the treatment of contaminated soil in order to separate both volatile and semi-volatile organic contaminants from soils themselves. The process operative temperature stands between 90 and 650 °C; the air of combustion or other inert gas are used as fluid of transportation to remove the contaminants. Compared to other incineration treatments, thermal desorption has the following advantages:
- emissions are usually free of polychlorinated - PCDD - and dibenzofurans - PCDF (dioxins);
- remediated soil still maintains the mechanical characteristics so it can be used for insustrial porpuses;
- treatment costs are certainly lower.

PRIMARY TREATMENT UNIT

The contaminated soil passes through the thermal unit and it is drawn from the opposite side, while the gases, which are produced by the heating, are sent to a ciclone for dust abatement and, later, to the thermal oxidizer to eliminate any unburnt compounds. The temperature, the residence time and vacuum level in the PTU are such as to allow water and contaminants separation, but not to cause thermal oxidation processes of the soil.

MATERIAL COOLING CHAMBER

The treated soil is cooled with water to prevent the diffusion of dust; then it is stored in a shed and sampled and analyzed to verify that the residual contaminant concentration is lower than the fixed level. If metals were present, the soil is sent to the inerting system for the following treatment.

DUST SEPARATOR CYCLONE

The gas leaving the primary unit are adequately treated to lead emission back to the law limits fixed for incineration plants (in Italy: Legislative Decree no. 133/05). The cyclone, using the effects of centrifugal force, separates the gases and dusts dragged through the air stream.

THERMAL OXIDIZER

The thermal oxidizer (Secondary Treatment Unit - S.T.U.) is used to treat the gaseous contaminants through a complete combustion; in this phase the temperature is about 1.100 °C, with a residence time of 3 seconds at least, according to the polluting compound.

EVAPORATIVE COOLING CHAMBER

Exhaust gases exiting the STU are vented into an Evaporative Cooling Chamber (E.C.C.), for gas cooling up to 200÷230 °C prior to baghouse entry, to prevent any damages to other machinery. Gases are cooled by injection of an air atomized water spray that becomes vaporized during the cooling process.

DRY SCRUBBER

The gases emitted from the thermal unit will be conveyed within a dry scrubber to remove acid gases (such as SO2, HCl and HF) which could be present in the air stream.

BAGHOUSE

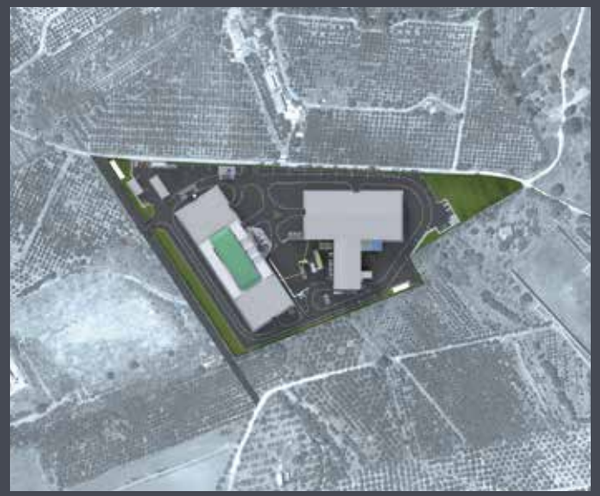
The exhaust air stream, through a negative pressure exerted by the ventilation system inside the upper part of stack for the emission.
The fine solid particles, instead, are trapped by the fabric filter bags, which are periodically cleaned through the pulse air jet system.

INERTIZATION PROCESS

The inertization process is used for the treatment of a wide set of waste, both hazardous and non-hazardous; it allows to considerably reduce the release of the pollutants present in the waste itself, through the formation of insoluble compounds that create stable structure able to imprison toxic elements (stabilization). The stabilization process operates on the chemical-physical state of the waste through the use of appropriate additives which block in a solid matrix the substances that are particularly diffcult to treat, such as chromium (VI), ammonia, arsenic and mercury.

MATERIAL FEED HOPPER

The material, through the feeding hopper, is conveyed to a vibrating screen, which separates the bigger fractions (stones, pieces of wood, pieces of metal, rags, etc.) that are collected in an appropriate container; the screened material is firstly conveyed under a ferrous metal separator and then it is directed to the mixer-reactor for the real treatment.



MIXER - REACTOR

All the reagents needed for the development of the process are conveyed into the mixer-reactor; these are lime, cement, sodium silicate and water as fluidizer. The chemical-physical reactions that take place inside the reactor produce a sort of sludge which is subjected to maturation, hardens and stabilizes, so it incorporates all pollutants.

MATURATION LANES

The inerted waste will be discharged into 3 maturation concrete lanes, through an internal system (digger, crane, etc.) and then directly into the charging system of trucks. All the shed is also equipped with a system for the suction and treatment of the inside air.

ADVANTAGES

The project designed has certain advantages because the used technologies allow to recover, through thermal desorption, the contaminated soil that can be used again or to transform, through the use of both processes, the hazardous waste into less dangerous materials, reducing the disposal costs due to the chance to use final plants located in the surroundings of the SIN. This drastically reduces the impacts deriving from longer industrial chains. Compared to traditional treatment technologies (in situ or ex situ bioremediation), both reduced duration and complexity of treatment will be achieved. Therefore the proposed system will provide signi cant economic and social advantages considering that in most cases the remediation activities in SIN are publicly funded.