



BAIONI®
E n v i r o n m e n t

Contaminated soils and sludge treatment plant

Client: Ecosistem Group, Lamezia Terme (CZ) – Italy

Challenge: to transform waste into product!

The Client possesses a large plant for the treatment of products contaminated with hazardous substances and materials, recycling of recovered materials and disposal of non-recyclable waste, which is considered highly innovative and technologically advanced in the field of environmental protection.

Solution: Design and production of a plant for the treatment of contaminated soils and muds by Baioni's Environmental Division. The Client has requested the inclusion of a new, more energetically efficient soil washing plant in the pre-existing waste stabilization/solidification line; a new soil washing plant that would rely on physical separation of contaminants from soils, inert materials, sand and gravel destined for recovery and valorisation. Baioni has successfully designed and constructed a fully modular plant: this means that the Client can rearrange the plant modules before each use in line with the materials to be treated without having to modify the machinery. Some of the materials that can be treated in this plant include drill cuttings, contaminated soils and road waste.

Duration: Initial site preparation: 5 weeks

Assembly: carried out by the client under the supervision of a technician from Baioni, 8 weeks.

Treatment: in progress, because the plant in question is fixed and indoors.

Achievements: The Client has successfully certified the entire treatment and processing line.

The output (sand) has a purity index of 96%.



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Sludge: the sludge produced following dehydration via a filter press is classified as category CER 190814 waste, i.e. sludge produced following treatment of industrial waste water.

As a result of Decision 2000/532/CE and subsequent modifications and amendments, and pursuant to Reg. CEE/UE N. 1357/2014 and Law 125/2015, such waste is considered non-hazardous because none of the contaminants contained within exceed the maximum limit set by law. As such, it can be handed over to suitable waste treatment plants.

Advantages of soil washing: SW takes advantage of the tendency of most organic and inorganic materials to absorb onto the surfaces of the smaller particles contained in soils, i.e. onto clays, silt and the organic content. In turn, these finer fractions adhere to sand and gravel. The washing process breaks up these aggregates and allows to concentrate the contaminants in a smaller volume composed of the above mentioned fine fractions, recovering a large portion of the matrix material which would otherwise be disposed. Hence, soil washing results in a significant reduction in the volume of contaminated soil.

Client Feedback: The Client is more than satisfied because Baioni delivered the materials on time and without exceeding the pre-set budget. Technical support during assembly was also good and the plant meets all the legal standards set for waste treatment and management plants. This is reflected by the Client's decision to certify the entire treatment line and not just the recovered material. The Client often hosts Italian and foreign visitors to the plant, which serves as an example of good working practice.



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Plant Description: output 10 t/h.

Waste characterization: seabed sand collected near off-shore oil refineries, petroleum drill cuttings.
Soil and rocks: special, non-hazardous waste

Type of analysis: Solid Waste Characterization; Thermal treatment; Landfill Leaching Test; Non-Hazardous Waste characterization, simplified procedure.

- Grain Size Analysis -

1. Oversieve 10 mm	0,6 %
2. Fraction 4-10 mm	2,0 %
3. Fraction 0,063-4 mm	80,4 %
5. Undersieve 0,063 mm	17,0 %

Contaminants: heavy metals, halogenated solvents, aromatics, nitrogen-based solvents, aliphatic solvents, hydrocarbons, phenols, chlorobenzenes.

Description of the treatment process: the plant takes advantage of a specific washing protocol that applies a synergetic combination of water, additives and reagents in the physical washing of inert materials. Hence, the soils undergo a series of treatments before their final degree of cleanliness is achieved. Used washing solution is chemically treated and reintroduced into the production cycle.

Final achievement: the quality of the output is excellent: it is a certified sand with a purity index of 96%. Not just the sand, but the entire line has been certified.

Output:



Aggregate name	Type	Stated Grain Size	Category	Ref. Standard	Petrography	Origin
sand	fine	0-4	Gf 85	heavy	Heterogeneous sand (UNI EN 932-3)	recycled

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The use of sand obtained using soil washing is in line with the harmonized technical specifications:

- Aggregates for concrete to be utilized in structures, roads and other civil engineering projects in line with UNI EN 12620:2008
- Notified body: AJA Registrars Europe Srl n° 2309
- Conformity certificate of the factory production control: n° 2309/CPR/0241



COMPOSITIONS OF THE MIXTURES CONTAINING THE RECYCLED AGGREGATES (UNI EN 13285) – DMAX<32mm	Test Method	Test Result (% Mass)	Reference Standard
Stone materials of any origin, rubble removed from work sites, concrete, bricks, fire-resistant materials, ceramics, hydraulic or non-hydraulic mortar, plaster, spent nuclear fuel and slag from iron metal foundries	Visual separation from 8 mm oversieve	100,0%	UNI EN 13285
Glass and glass waste		Absent	
Bituminous conglomerates		Absent	
Other mineral waste		Absent	
Materials that decompose: paper, wood, textile fibers, cellulose, food remains, organic substances excluding bitumen; hallow plastic materials: corrugated materials, tubing or plastic bottle parts, etc.		Absent	
Other materials: metals, gypsum, insulation, rubber, stone or glass wool, etc.		Absent	
> 63 mm sieved fraction	UNI EN 933/1	100%	UNI EN 933/1
> 0.063 mm sieved fraction		1,0%	

Standard sieve series +2 (mm)	Passing total (%)
8.0	100.0
6.3	100.0
4.0	99.1
2.0	87.9
1.0	74.8
0.500	63.9
0.250	38.9
0.125	6.3
0.063	1.0
bottom	0.0

Fineness modulus: 2.3

