



Ecopetrol Ltd
RECLAMATION AND RESTORATION OF THE ENVIRONMENT
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The firm

Introduction

Our firm was originated in 1994 by an idea of two partners who had already worked in the field of environment services in the past, and more precisely in the branch of reclamation and covering of interred tanks, in close co-operation with leading firms of the field (Mannesmann, Siac, ENEL, etc.)

Beginning from the activity of petrol tanks reclamation we have started to offer, during the last years, a growing range of services in the matter of ecology, keeping the quality levels we achieved during the years.

The activities

The know-how in regard to all the problems of the environment and the continuous investment of energies, both in the staff's training and in the use of special and specific equipment, have allowed us to operate throughout the national territory and to guarantee the best solution for any kind of intervention, respecting completely the environment and the rules of safety.

Obviously, the main activities concern the interventions in places where petrol is sold and they may be identified as follows:

- Reclamation of interred and not interred petrol tanks and subsequent internal covering, through different techniques of vitrification (with rollers, airless, double wall) with or without previous sand-blasting of the walls;
- Non-destructive capacity tests and metric control of thickness;
- Reclamation of tanks which have contained ethylic petrol;
- Reclamation for the subsequent dismantling of ethylation plants;
- Leaving off and dismantling of petrol distribution plants and subsequent restoration of the area (including excavation, extraction of the tanks, reducing to wreck, eventual reclamation of contaminated soils and final restoration);
- Cut, transport and reducing to wreck of the dismantled tanks;
- gathering, transport and stockage nearby our plants, complete destruction of dangerous and non-dangerous waste material;
- Construction of floating anti-pollution barriers.

Safety system of the firm

Our firm has acquired a safety system which is able to:

- identify the obligations as by law enacted in this matter;
- identify the aims and actual measures of improvement;
- activate the safety measures for the improvement;
- survey the correct course of each activity.

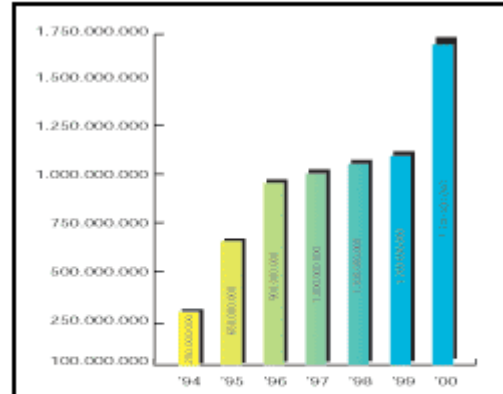
All this is foreseen in our document of evaluation of the risks, drawn up by prevention and production services managers.

This document has been carefully prepared following the regulations in force with regard to the safeguard of the safety and health conditions in working places. It defines the tasks and the areas of responsibility involving all the firm's figures, beginning from the technical manager for the management of waste-materials, to the competent physician, to the several foremen etc.

Ecopetrol Ltd., recognising a big importance to the theme of the workers' safety and health, intends to prevent and reduce to the minimum situations which may be potentially dangerous or detrimental; therefore it has trained and informed the complete staff about specific risks, through a continuous training activity, courses about the emergency measures, controlled medical examinations, utilisation of individual protection devices, attainment of temporary gas and toxic licences. The observance of all the rules of our safety handbook, which each worker possesses, reduces the risks of accidents on the working place and permits to operate in the best safety conditions. Moreover, for each yard we elaborate carefully a specific operative plan on the ground of the type of intervention and activities to carry out.



Development of the firm 1994/2000



Profilo aziendale 1994/2000
Development of the firm 1994/2000

RECLAMATION, SAND-BLASTING AND RESTORATION OF THE TANKS

Reclamation

This operation is absolutely necessary for the cleaning and it precedes each activity of control, of restoration through vitrification or of removal.

It's the most delicate stage as it requires the respect of all the safety rules.

The teams are made of three operators, the foreman is also responsible for the safety on the yard.

The whole equipment is specifically for the use in presence of toxic vapours and explosive gases, the means of transport are authorised as by law enacted.

For each intervention of reclamation we issue the respective card with the relation of the works which have been carried out and the conditions of the tanks.



Sand-blasting

After the reclamation, this type of intervention, even if optional, guarantees the good result of the vitrification in terms of adherence and therefore in endurance, as it prepares the surface which has to be treated to a better seize of the resins. In fact, it doesn't only remove eventual and pre-existent

residual products, but it smoothes the surface and in the same time makes it uniform, ready to be covered.

These operations take place by using specific equipment for the internal sand-blasting of the tanks (or of the cement tanks) and sands with the minimum thickness in order to guarantee the best result.

Restoration

In these specialisation levels ECOPETROL Ltd. has achieved qualified experience; there exist different ways of restoration of the damaged or pierced tank which are applied following different ways of realisation:

Traditional method with rollers this method consists in the utilisation of special fabrics in fibre glass of 1050g/m², impregnated with particular isophtalic resins till the obtaining of a thickness from 2.5 mm to 4 mm.

Airless vitrification consists in the spray application, through AIRLESS equipment, of a coat of epoxydic resin and a coat of antistatic covering on the whole surface to treat till the obtaining of a thickness of max. 4 mm. The utilised products are suitable for containing any kind of hydrocarbon on sale at the present.

Double wall covering After having carried out the usual operation of cleaning, we'll apply a coat of a clinging product followed by knotty aluminium through a biadhesive tape at the inside of the tank. The covering will be completed utilising an AIRLESS system followed by a spray application of epoxydic resin on the aluminium and a final touch of antistatic product. This system offers the possibility to create a second surface at the inside of the tank, especially if the plate is damaged. This system guarantees the re-utilisation of the restored tank respecting the laws 22/97 and 246 from 05/24/99.

At the end of each kind of covering we'll issue a valid certificate of guarantee.

RECLAMATION OF ETHILIC PETROL TANKS

We offer this service above all for the stockage centres of the refineries or for the stock yards, where it is necessary to control periodically the condition of the tanks, to modify the structure of them or because of the change of the product inside of them. During the work of cleaning and reclamation of these tanks, Ecopetrol Ltd. respects the safety and hygiene rules of work prescribed by Octel-Siac.

Operative procedure

The specialised workers for the reclamation, equipped with pressurised diving-suits with forced feeding, enter into the tank in order to remove rust and dross with suitable anti-spark equipment.

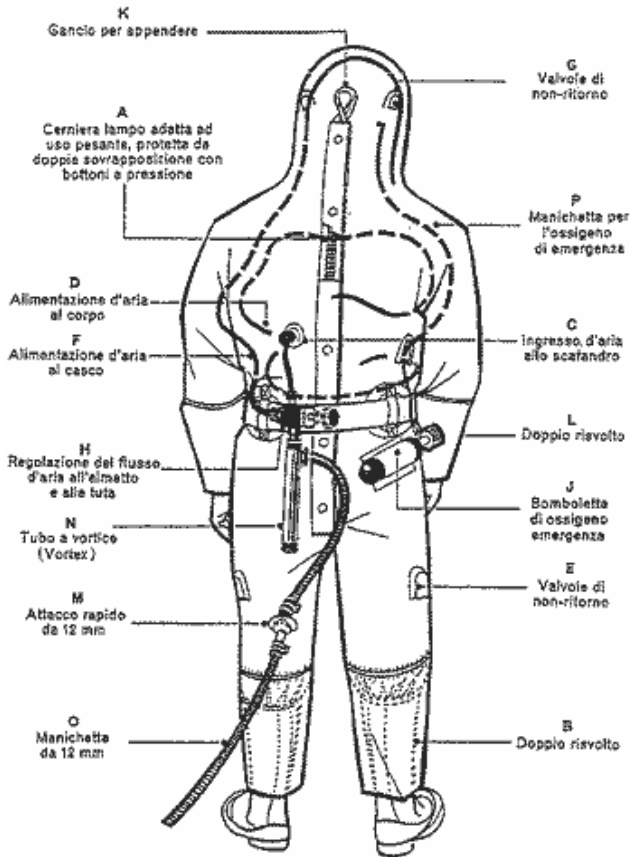
The removed residual products are transferred outside through suitable pumps, where possible, or manually.

At this point, the external workers, provided with protective garments, will provide for the stockage of the residual products into suitable containers. The final cleaning of the bottom of the tank, of the floating roof, of the seal



packing, of the whole internal surface of the cover will be carried out using a high pressurised hydro-cleaner.

Details of the forced air diving-suit RFD-GQ Mark VII



- K- Hang-up hook
- A- Zip-fastener for heavy utilisation, protected by a double superimposition with pressure-buttons
- D- Air-supply to the body
- F- Air-supply to the helmet
- H- Air-flux regulation to the helmet and to the suit
- N- Vortex pipe
- M- Rapid pipe connection of 12 mm
- O- Hose
- G- Non-return valves
- P- Emergency oxygen hole
- C- Entrance for the air to the diving-suit
- L- Double cuff
- J- Little oxygen bottle of emergency
- E- Non-return valves
- B- Double turn-up

RECLAMATION AND CAST-OFF OF ETHYLATION PLANTS

Ethylation plants

The ethylation plants are productive plants at a high risk both of explosiveness and of toxicity.

Against these risks, Ecopetrol Ltd is able to carry out the following interventions:

- Drawing of product samples
- Disassembly and partial or total demolition (elimination/removal of tanks and of obsolete lines)

Ecopetrol Lt. operates with professionalism employing:

- Specific means and equipment;
- Qualified staff possessing the license for the preparation of toxic gases (TEL/TML);



Ecopetrol Ltd., as regards the intervention of demolition, adopts the operative procedures ripened in many years of co-operation with the following companies: ITALIAN MANNESMANN and SIAC/OCTEL:

a) Disassembly of the plant:

- Exclusive use of pneumatic equipment;
- Dissection and isolation of all the plant's elements;
- Continuous control in order to avoid any risk of product shedding (petrol, ethyl-fluid, colouring matter) and of both inflammable and toxic vapours;

b) Transfer of all the plant's elements to a proper area at the inside of the refinery:

- Accurate inspection of the zone for the valuation of the eventual presence of little wells and of reflux lines;
- Drawing up of a double signalling circumscription of the operative area with sign-boards showing the obligation to protect the respiratory ways with suitable DPI;
- Creation of openings on the bombed bottoms of the tanks using a specific pneumatic equipment;
- Entry into the tanks of the workers who are equipped with diving-suit with air flux (MOD. OCTEL);
- Removal, arrangement in drums of both liquid and solid residual products;
- Pneumatic striking of the whole internal plating, in order to remove any residue of oxides and of product encrustation;
- Transport and forwarding of the residual products to thermo-destruction.

c) Decontamination:

- Cut (oxypropanic torch) of all the plant's elements into "ready for furnace" speckling;
- Flaming-out of the wrecked products (about 600°C) with oxypropanic lances;
- Transport and forwarding to remelting of the wrecked products, upon degree of decomposition control;

During the working stages, Ecopetrol Ltd. monitors the environment (explosiveness and toxicity) employing suitable and specific implements. Each analysis will be certified by a qualified engineer. Ecopetrol Ltd.'s services will be carried out with the highest safety with regard to the environment and staff and respecting the laws in force.

GATHERING, TRANSPORT, STOCKAGE AND GETTING RID OF THE WASTE MATERIAL

Ecopetrol Ltd is authorised, throughout the national territory, to gather and transport special waste material, which is prevalently produced in the areas of petrol services.

Our service consists in gathering, transporting and in the stockage of different kinds of waste material, disused tanks, hydrocarbon-polluted water, waste material rising from the reclamation.

Transport

The transport is carried out with special motor-vehicles, which are authorised according to law in force and through the registration in the National List of Enterprises which carry out services concerning waste materials.

After the reclamation operation, the



waste materials are transported into our storage, which is authorised according to law, for the gathering of different kinds of waste material, and especially those which are polluted by hydrocarbon. Washing-waters and residual products are transported in regular little and big drums in order to be stored in our stockage area.
of the tanks.

Stockage

Our stockage plant consists in:

- Tanks for the stockage of liquid waste material polluted by hydrocarbons, placed into tin cement basins;
- Shed for the stockage of sheet drums;
- Large squares for the stockage of solid waste materials prevalently polluted by hydrocarbons
- Tins basins for the stockage of polluted soils and mud.

All this waste materials are then forwarded to complete destruction or to recuperation in accordance with their type and according to law.

TRANSPORT, CUT AND REDUCING TO WRECK OF DISUSED TANKS

The disused tanks are subject to the law concerning recoverable waste materials and therefore they need special authorisations for their transport and stockage.

Respecting the operative procedures (API - American Petroleum Institute rules), Ecopetrol Ltd. owns motor-vehicles according to law, equipped with cranes and kits for the cut with torch, made up by a device for the measure of the explosiveness, an air extractor with anti-deflagrating engine and small shovels against sparks, a generator of 30 kW/h; a compressor of 500 litres; cut machines with a velocity of 2 metres per minute with a sheet of 5,7 mm. Furthermore, in case of big tanks, our firm owns hydraulic shears for the cold cut.

After having cut the tank, in accordance with the requests of the refineries (1 m x 1 m), the sheet will be transported



and stored in our authorised storage and then sent to foundry through a firm which is authorised by the Local Authority for the collection of secondary raw materials.

DISMANTLING AND RESTORATION OF AREAS OF FORMER PETROL DISTRIBUTORS

According to the laws in force, the areas used as petrol distributors, if out of commission, have to be get disused. Therefore the necessity to dismantle the plants which are disused by now.

- These are the main activities with regard to the dismantling:
 - Previous investigation on the spot in the site with photographic surveys;
 - Intervention of removal of lighted poles, sign-boards, kiosks, penthouses, distributors etc. and demolition of the bases;
 - Eventual cut of the road-bed and subsequent excavation and extraction of the interred tanks and piping through suitable mechanic means, after internal reclamation;
 - Putting them in reserve for volumetric reduction;
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- Cut and reduction to wreck of the tanks and of all kinds of waste materials after having them chosen;
 - Complete destruction of residual products;
 - Eventual environment research with operations of drawing for chemical analysis of the soil;
 - Refilling of the excavation with inert material and compacting of it; subsequent reconstruction of the road-bed in cls or restoration of the pre-existent paving.

CONSTRUCTION OF FLOATING ANTI-POLLUTION BARRIERS

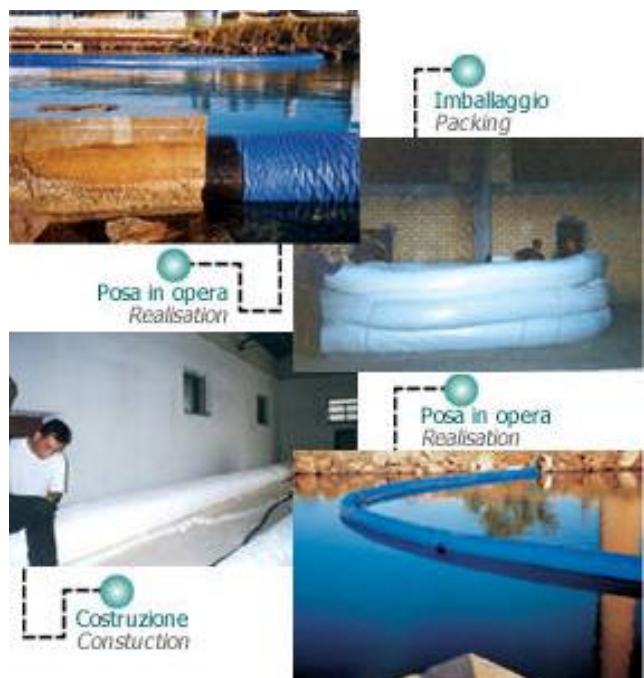
Barriers type CF

The hand-manufactured article consists in a peak on which are connected the floating systems.

This flexible support is covered by a synthetic ribbon and the whole article is covered by a net of the same fibre; subsequent stratum of net and ribbon complete the hand-manufactured article. The barrier may be equipped by a ballast appendix and by a protective cover.

The cut-down sizes are united through the connection of the central peaks which come out of the heads.

Once obtained the saturation condition from oil, the synthetic fibre continues to carry out its containment function. The dimensions of the CF may vary in accordance with its employment, such as: fixed barrage on canals and lakes;

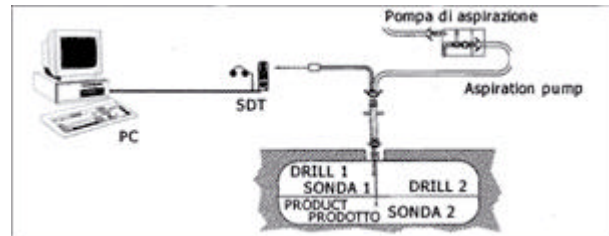


nearby energy producing centres, industrial plants and sea intakes of desalting devices.

mobile barrage in order to circumscribe and to hold back the pollution by hydrocarbons.

NON DESTRUCTIVE CAPACITY TESTS AND METRIC CONTROL OF THICKNESS OF THE TANKS

The SDT system allows to notice, through ultra-sounds, the presence of the littlest anomaly of the tank, which is put under depression, permitting in this way to estimate immediately the damage, or the presence of cracks or openings in the tank.



Furthermore, this intervention doesn't require to empty the tank, because it's a depression system which doesn't permit the liquids to get out of eventual holes in the tank.

Finally, we guarantee all the safety and trusting characteristics, because it is a system which respects the laws concerning the control of the tanks. It's easy to follow the stages of realisation on the scheme:

- The tank is disconnected from the loading, aspiration and balance pipes
- The aspiration and balance pipes are sealed
- We connect a rapid pipe connection at the loading pipe of the tank, into which we introduce the connection cables between the drills and the SDT system
- One drill is put above the liquid, the other will be immersed into the product
- We'll connect the aspiration pump of the air with vacuum breaking safety-valves at the rapid pipe connection, which is prepared considering the volume and the type of tank which has to be tested.
- We'll put the tank under depression and the sensors will detect ultra-sounds produced by holes or cracks
- The ultra-sounds are transmitted to the SDT system which emits a sound and shows them on the display of the PC.

Metric control of thickness

This examination is necessary to identify the eventual presence of corrosions and therefore to find out the average thickness of the tank's sheet, which has to be proved by manual examination or by ultra-sounds. This operation allows to know the thickness in different points at the inside of the tank which will be registered on a specific card.

Where we are

