

Environmental Impacts Management of a Brazilian Gas Station: A Case Study

Thales Botelho De Sousa¹

¹ University of SAo Paulo

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Abstract

The relative questions to the impacts of human activities in the environment are becoming increasingly present in world population's life, by receiving great attention from various segments of society in recent years. All industrial sectors are pressured to achieve its activities in harmony with the environment. The gas stations, exercising potentially polluting activities, because of stored and sold products, as well as effluents, emissions and generated residues, must conduct its activities according to standards and laws to ensure the minimization of risks to the environment, safety and health of employees and neighboring community. In this sense, the focus of this paper is to present, based on a case study, what the environmental management measures adopted at a gas station located in the São Paulo State, Brazil to control environmental impacts generated by its activities, as well as adapt to environmental regulations. It was chosen only a single case study because of the possibility of obtaining more detailed information of the subject and studied organization.

Index terms— superalloys, phase reactions, differential thermal analysis, latent heat of solidification.

1 Introduction

he concern with environmental conservation and sustainable development of human activities is a topic of great relevance. In recent times, it is possible to feel with great intensity the negative effects of human activities developed over the centuries without worrying about the quality of the environment.

In view of the various environmental disasters occurring today, it is great desire of society for sustainability, which requires of organizations (especially those that pollute or that have the potential to pollute the environment) a more harmonious coexistence and balanced environmental development of its activities. According to Cavalcanti (2010) the efforts carried out to promote the improvement of pollution levels, both associated with air, water, soil and other environmental compartments are essential, especially due to growing concern of combining economic development and sustainability.

The gas stations represent a business activity branch which basically sell alcohol and fossil fuels. These fuels, although high in energy density, are known to cause high levels of air pollution and are blamed for contributing to climate change and global warming (SHUKLA, PEKONY and VENKATASUBRAMANIAN, 2011). These fuels also are important sources of contamination of the soil and the water, and have been the subject of numerous studies due to the complexity of the phenomena of interaction of these pollutants with the soil and the large number of contaminated areas (FREIRE, TRANNIN and SIMÕES, 2014). Additionally, the environment where gas stations are localized exposes gas station attendants to several risks and health hazards, which should be considered harmful to the health status of these workers (ROCHA et al., 2014). Among the risks are the contact with fuels and other chemical products, remaining close to fuel pumps, noise, etc. (ROCHA et al., 2014).

According to Freire, Trannin and Simões (2014) there are approximately 36 730 gas stations in Brazil. Gas stations in Brazil are commonly located in residential and commercial areas, which can lead to the degradation of health quality for people who live and work in the neighborhood (CORRÉA et al., 2012). Bearing in mind

4 LITERATURE REVIEW A) ENVIRONMENTAL IMPACTS CAUSED BY GAS STATIONS

44 that all installation and oil and other fuels' storage systems are characterized as enterprises partially or
45 potentially polluting and generators of environmental accidents, due to the large potential of pollution severe
46 and environmental impacts that can generate, the environmental licensing of gas stations became mandatory in
47 all Brazil after publication of CONAMA Resolution No. 273/2000. In the São Paulo State, became mandatory
48 after the publication of SMA Resolution No. 05/2001.

49 Gas stations as emission sources of pollutants in the atmospheric air, contaminants in the soil and groundwater
50 have been the subject of considerable study, a particular interest being those related to the design and evaluation
51 of control systems in an attempt to diminish environmental impacts (TERRÉS et al., 2010). Based on statements
52 highlighted, this paper has as purpose to present through a case study how the management of environmental
53 impacts of a gas station localized in São Paulo States carried out. For this the research sought to answer the
54 following questions: 1) What are the main environmental impacts generated by the gas station?

55 2) How does the compliance with current environmental legislation impact the effective management of
56 environmental impacts generated by the gas station?

57 II.

58 2 Methodological Procedures

59 According to its goals, this paper can be classified as an exploratory research. The exploratory research was chosen
60 in order to provide greater familiarity with the problem, in order to make it more explicit or form hypotheses, and
61 their schedule is quite flexible, so it allows the consideration of various aspects related to the fact studied (GIL,
62 2010). In most cases, these studies involve literature review, interviews with people who had practical experience
63 with analyzed problem and researched examples that encourage understanding (GIL, 2010).

64 Regarding the technical procedures used to carry out this paper, it was designed by a case study and
65 bibliographical researches. For Gil (2010), the case study is the detailed and exhaustive study of one or a
66 few objects, in a way that allows its broad and thorough knowledge. Despite the limitations, the case study is the
67 most appropriate method to know in depth the characteristics of a particular organizational phenomenon (YIN,
68 2010). Although Eisenhardt (1989) and Miguel (2007) recommend the use of multiple case studies for obtaining
69 more concret results, Yin (2010) states to conduct single case studies it is justified if the case constitute a rare
70 event or unique or serve as a revealing way. In this paper, a single case study was carried out because of the
71 possibility of obtaining more detailed information on environmental impacts of a gas station.

72 For achieve this case study were done researches on the main aspects and environmental impacts of sector,
73 prepared questionnaires that were sent to the person in charge and were made technical visits in the gas station.
74 In the technical visits, it was possible to get a better structured description of facilities, environmental licenses and
75 the development of the post activities. The gas station object of the case study, as a restriction for collaboration
76 in the research, requested confidentiality regarding their identity, so in this paper will be cited as Gas Station A.

77 The bibliographical researches on environmental impacts of gas stations were especially conducted on SCIELO,
78 SCOPUS and Web of Science databases because of its broad access and impact in the international academic
79 community, and papers published in journals indexed in them being considered as the research of the highest
80 scientific level (CARNEVALLI and MIGUEL, 2008; NGAI et al., 2008). Some information from papers published
81 in other databases and laws were obtained, because although they have less relevance for impact researches,
82 certainly can have important issues (BORTOLLOSSI and SAMPAIO, 2012).

83 3 III.

84 4 Literature Review a) Environmental impacts caused by gas 85 stations

86 Gas stations represent a business activity branch that works primarily with the retail sale of fossil fuels and bi-fuels
87 (LORENZETT and ROSSATO, 2010). These endeavors store various types of fuel tanks that in most cases are
88 underground, also possessing a set of lines and pumps that are part of the storage system and commercialization
89 of products (CATUNDA et al., 2011). Because of the fuels that store and activities that develop these endeavors
90 have great potential for degrading the environment where they are localized.

91 The contamination of the soil and consequently of groundwater is one of the major environmental impacts
92 caused by the activities of gas stations, since this is related to health problems, environmental damage and
93 adverse social impacts. There are several sources of groundwater contamination. However, one of the most
94 hazardous is contamination through leaks in underground storage tanks of fuel, the severity of which increases
95 due to the characteristics of the fuels being rich in toxic substances of a mutagenic and carcinogenic character,
96 and to the great likelihood of movement in the soil, and the fact that a leak is not always detected immediately
97 (ROCHA, SOARES and MEDEIROS, 2011). Over time these tanks may leak due to corrosion, cracks, defective
98 piping, and spills during refilling and maintenance activities. Petroleum and other fuels pollution from leaking
99 underground storage tanks leaches into the surrounding soil and groundwater and can damage nearby water
100 bodies and ecological systems (ZABEL and GUIGNET, 2012).

101 The increase in groundwater use has raised concerns related to the main sources of pollution, among which
102 are included those caused by leaks in fuel storage tanks such as petrol, diesel and alcohol. Contamination of soil

103 and groundwater by fuel storage facilities carry risks to human health directly and indirectly. In direct contact,
104 it can highlight inhalation, ingestion, skin and eyes contact; in indirect contact, there is the ingestion of food and
105 water contaminated with compounds present in fuels, which in most cases are carcinogenic(FREIRE, TRANNIN
106 and SIMÕES, 2014).

107 Petroleum by-products are harmful to human health.By filling the tank, e.g., with petrol, there is an exchange
108 of saturated vapor inside the tank of the vehicle by the corresponding liquid fuel coming from the underground
109 tank. This underground tank also makes this exchange of saturated vapor by liquid fuel to be supplied by the
110 tanker truck (CORRÊA et al., 2012). Vapors can travel upwards through the soil into nearby homes and buildings.
111 These vapors, known as volatile organic compounds (VOCs) poses acute health risks caused by inhalation such as
112 headaches, asthma, fatigue, throat, eye irritation nausea, mucosal symptoms and even risks of explosion (EMARA
113 et al., 2010;PEREZ-RIAL et al., 2009;TERRÉS et al., 2010). Exposure to petroleum by-products such as gasoline
114 and diesel oil over long periods of time increases the riskof several chronic diseases, including cancer, and can
115 affect the kidneys, liver, and nervous system (CORRÊA et al., 2012;YANG et al., 2014;ZABEL and GUIGNET,
116 2012).

117 Gasoline is a petroleum-derived liquid mixture consisting primarily of hydrocarbons and enhanced with
118 additives to increase octane ratings, and improve performance in internal combustionengines (KINAWY, EZZAT
119 and AL-SUWAIGH, 2014). According to Haest et al. (2010) it is a light non-aqueous phase liquid that typically
120 comprise C6-C8 mono-aromatics (benzene, toluene, ethylbenzene and xylenes, broadly known as BTEX) and
121 other additional constituents such as methyl tertiary butyl ether (MTBE). Gasoline spills are among the most
122 frequent causes of groundwater pollution. If released into the subsurface, it migrates through the vadose zone
123 until it reaches the water table (HAEST et al., 2010). Furthermore, gasoline vapour emissions constitute one
124 of the main sources of air pollutants in gas stations. There is a wide range of volatile aromatic hydrocarbons
125 (VAHs) present in the atmosphere of gas stations as a result of emissions of vapours during dispensing, loading,
126 unloading and transportation of gasoline (EDOKPOLO, YU and CONNELL, 2014).

127 Diesel oil leakages from underground storage tanks, distribution facilities and various industrial operations
128 represent an important source of soil and aquifer contamination (MARIANO et al., 2007). Diesel oil contains
129 2000 to 4000 hydrocarbons, a complex mixture of normal, branched and cyclic alkanes, and aromatic compounds
130 obtained from the middle-distillate fraction during petroleum separation (MARIANO et al., 2008).Some of the
131 polycyclic aromatic hydrocarbons (PAHs) -compounds of diesel oil are among the least affected by weathering,
132 and these semi-volatile compounds with a low solubility and recalcitrant characteristic may persist for a long time
133 in the environment (MARIANO et al., 2008), being listed as priority pollutants by international environmental
134 protection agencies due to their carcinogenic, mutagenic, and toxic effects (GARCIA et al., 2010).

135 Another fuel broadly stored and sold in gas stations currently is the ethanol. In Brazil, ethanol produced by
136 sugar cane juice fermentation is the most used (TANO and BUZATO, 2003) Another relevant environmental
137 impacts caused by the activities of gas stations are the effects caused by fires, which, when they occur, are very
138 harmful to employees, customers, owners, and the neighborhood and may cause fatalities; and the impacts caused
139 by their respective wastes from auxiliary services provided (ROCHA, SOARES and MEDEIROS, 2011).

140 According to Lorenzetti et al. (2011) environmental management at gas stations can be understood as the
141 measures carried out by the establishment that contribute to the protection, preservation and environmental re-
142 covery, measures ranging from deploying more secure facilities to the maintenance of green areas of environmental
143 preservation, taking into account that in the absence of environmental management measures entities may incur
144 in environmental impacts, affecting not only the environment but also all forms of life, especially humans. The
145 activity of gas stations is becoming increasingly complex, since the cost of environmental accidents is high, and
146 therefore, these endeavors must carry out their activities in accordance with the standards and environmental laws
147 in order to ensure the minimization of risks to the environment, safety, employees and surrounding community
148 health (CATUNDA et al., 2011). Given these dangers and severe environmental impacts, some pre cautions must
149 be taken in the handling of petroleum products in order to prevent fire, diseases and risks to people, soil, air and
150 water. In view of this, it is important to know environmental legislation applied to this sector.

151 **5 b) Environmental licensing of gas stations in São Paulo**

152 State, Brazil According to CONAMA Resolution No. 01/1986 environmental impact is defined as any change
153 in physical, chemical and biological environment, caused by any form of matter or energy resulting from human
154 activities that directly or indirectly affect health, safety and welfare's population, social and economical activities,
155 the biota, the aesthetic and sanitary conditions of the environment and the quality of environmental resources.

156 CONAMA Resolution No. 237/1997 defines environmental licensing as an administrative procedure whereby
157 the competent environmental agency licenses the location, installation, expansion and operation of projects and
158 activities that are considered effectively or potentially pollutant and that use environmental resources, or those
159 who, under any form, can cause environmental degradation, considering the laws and regulations and technical
160 standards applicable to the case.

161 As a tool for pollution prevention, the licensing is essential to ensure the environmental quality of organizations,
162 including public health, economic development and biodiversity conservation. Obtaining environmental licenses,
163 coupled with the fulfillment of technical requirements, forms the basis for environmental compliance, adapting

8 B) ACTIVITIES DEVELOPED IN GAS STATION A CURRENTLY

164 the organization to the competitive market. Environmental licensing is divided into three stages, the end of
165 which are subsequently issued the preview, installation and operation licenses.

166 The environmental licensing of gas stations became mandatory in all Brazil after the publication of CONAMA
167 Resolution No. 273/2000. According Lorenzett and Rossato (2010), this resolution aims to stabilize the
168 enterprises that have fuel storage tanks and how management measures and environmental licensing of activities.

169 In According to CONAMA Resolution No. 273/2000, the competent environmental agency will demand the
170 preview, installation and operation environmental licenses. The activities which are object of licensing understand
171 fuels storage and supply, and other related processes such as car washing, oil change, vehicles lubrication and
172 related administrative services. Should not be included in the licensing other activities usually associated with gas
173 stations, such as convenience stores (unless they harbor activities related to the supply fuels), shops, restaurants,
174 snack bars, parking, garage and other commercial activities (CETESB, n. d.).

175 6 IV.

176 7 Case Study in the gas Station a a) Gas station A's operational 177 history

178 According to information obtained from the responsible person of the gas station' administration during the
179 interviews, the endeavor began its activities in 1995, selling alcohol, gasoline and diesel oil, making the lubricating
180 oils' change, and selling other products in an annex convenience store.

181 In 2001, the gas station A was summoned by CETESB to obtain the necessary environmental licenses, in
182 compliance with SMA Resolution No. 05/2001. It was summoned in the time by CETESB to license up adapting
183 to the operation minimum conditions, because according to the classification of the environmental agency, it was
184 classified into the category of enterprises subject to adjustment to the minimum operation conditions, because
185 their tanks and underground pipes had less than 15 years.

186 In compliance with the necessary procedures for environmental licensing, it was conducted a technical
187 assessment of environmental liabilities in the Gas Station A's area, to verify if it was contaminated by chemicals
188 present in fuels derived from petroleum, which are parameters BTEX (benzene, toluene, styrene, ethylbenzene
189 and xylenes); parameters PAH (polycyclic aromatic hydrocarbons), which include substances as anthracene,
190 benzo (a) anthracene, benzo (k) fluoranthene, benzo (g, h, i) perylene, benzo (a) pyrene, chrysene, dibenzo
191 (a, h) anthracene, phenanthrene, indeno (1,2,3-c, d) pyrene and naphthalene, and due to oil change's activities
192 development, the parameters TPH (total petroleum hydrocarbons). The technical assessment report testified
193 that the area was not contaminated by any of the compounds, because all parameters were below the limits set by
194 the CETESB' Decision of the Board No. 014-2001-E, which in the time defined limits allowed for each compound
195 in soil and groundwater. It was also carried out an inspection by the Fire Department in order to certify the
196 conformity of the facilities on the risk of fires and explosions, being issued the AVCB (Auto de Vistoria do Corpo
197 de Bombeiros or Fire Department's Inspection Certificate), which should be renewed every three years because
198 its expiration date.

199 The gas station received the operation license in 2001, with an expiration date of 5 years because the value of
200 it w (activity complexity factor) is equal to 1.5, according to the classification established by State Decree No.
201 8,468/1976. In compliance with the technical requirements and aiming to avoid the occurrence of environmental
202 liabilities, the gas station made annually sealing of tanks, gas pumps and equipments, as well as its underground
203 pipes. In 2006, the operation license' renewal was obtained.

204 In 2011, with the operation license validity end, and how it could not renew due to the fact that the tanks
205 and pipes had completed 15 years, the gas station requested the environmental licensing in adaption to the
206 category subject to complete renovation of their facilities, obtaining preview and installation licenses, and later,
207 the operation license. To obtain these environmental licenses the following activities were carried out:

208 8 b) Activities developed in gas station A currently

209 According to data from the questionnaires and the observations made during visits techniques, the following
210 activities in the gas station A are developed: 1) Fuel storage: for the development of this activity the gas station
211 has two underground tanks, located in their vicinity. These tanks have a capacity of 30 000 liters of fuel each,
212 totaling 60000 liters of fuel stored. One of the tanks is two-compartmented and stores gasoline and ethanol,
213 the another is tricompartmented and store gasoline, ethanol and diesel oil. 2) Vehicles supply: this activity is
214 carried out by attendants and occurs on the supply track through the use of five supply pumps. 3) Lubricating oil
215 change: this activity is developed in a location away from the administration, which has a ramp built to provide
216 greater security in the operation of the activity, and where the burned oil is stored in drums to be collected by
217 a reprocessor company. 4) Convenience store: in this place are sold snacks, drinks and other food products. 5)
218 Administration office: in this local are developed activities of administration and management of the activities
219 of the gas station.

220 9 c) Main environmental impacts of the gas station A

221 The main environmental impacts generated by the development of the gas station A's activities can be viewed
222 in Table 1.

223 10 d) Main measures to manage the environmental impacts of 224 the gas station A

225 Through of the observations obtained during visits, from questionnaires answers, environmental licenses analysis
226 and technical analyzes results of environmental liabilities carried out, it was observed that the gas station
227 A is managing adequately the main environmental impacts caused by the development of its activities. The
228 total fulfillment of essential technical requirements defined by environmental agency to develop the fuel resale
229 and other related activities strongly helps the gas station in successful reach of the environmental resources
230 preservation. It was also observed that the impacts management began in the period of first operation license
231 obtaining, increasing effectiveness in preview and installation licenses obtaining, in compliance with the technical
232 requirements demanded for obtaining the operation license of the year 2011. The relation of the main actions
233 taken to contain or mitigate the gas station A's environmental impacts today, can be seen in Table 2. Gas station
234 equipment and facilities cleaning Oilywaters -Waters drainage system construction, internally positioned to 55
235 centimeters from the covering projection of the supply track; -Drainage system installation and sewage treatment
236 system constituted of the sandbox and water-oil separator with coalescing plates, for effluents generated in the
237 supply track; -Sending of sandbox toxic mud and water-oil separator for a treatment company correctly licensed.

238 11 Lubricating oil exchange

239 Product spill -Installation of effluent treatment system constituted of the sandbox and water-oil separator with
240 coalescing plates for the effluents produced in the oil exchange and area cleaning operations; -Oil change area
241 built in waterproof floor; -Used oil storage in drums located in area with containment basin and cover; -Used oil
242 dispatch for refinery company correctly licensed.

243 12 Residues release

244 -Packages dispatch to specializing companies in contaminated packages cleaning, with its subsequent proper
245 disposal.

246 13 Convenience store

247 Residues release -Final disposal in municipal landfill.

248 14 Administration office

249 Residues release -Final disposal in municipal landfill.
250 V.

251 15 Conclusions

252 Nowadays, due to the intense problems related to environmental degradation, the world lives a period where
253 the environmental issue is gaining momentum, environmental agencies are increasingly active and environmental
254 legislation increasingly rigorous. Due to intense environmental impacts that the development of its activities
255 can generate, the environmental legislation applied to gas stations are increasingly severe, requiring effective
256 preventive and corrective actions with respect to the generation of environmental accidents.

257 Environmental licensing shows up as an important instrument for the environment preservation by the gas
258 stations, because the fulfillment of their demands provides an efficient control of various environmental impacts
259 generated by the activities developed by the sector.

260 The fuels resale activities are becoming increasingly complex, given that the environmental accidents and
261 incidents costs, as well as costs for its remediation are high, requiring that gas stations to carry out their activities
262 in accordance with the existing environmental laws and regulations as well as compliance with good work practices,
263 in order to ensure the minimization of risks to the environment, safety and health of employees and neighboring
264 community.

265 This study aimed to analyze through a case study, what the environmental management measures adopted in
266 a Brazilian gas station, which aim to meet the principles of sustainable development, and at the same time, the
267 guidelines of environmental legislation applied to the sector.

268 During this study it was observed that the activities developed by the gas station A are fuel storage, vehicles
269 supply, lube oil change, convenience store and administration office. Such activities maintain direct and intense
270 relationships with the environment, through of contact with soil, groundwater and air, which can cause direct
271 and indirect impacts on them, on the facilities of the station, adjacent facilities and human health.

272 During the study achievement, analyzing the environmental licenses of gas station it was possible to observe
273 that the legislation has a focus on possible accidents involving fires and leaks into the soil and groundwater, but

15 CONCLUSIONS

274 it is necessary to give more attention to emissions into the atmosphere, which was also stated by Corrêa et al.
275 (2012).

276 This paper presented how the environmental management in a gas station which is not contaminated for fuels
277 derived from oil is carried out. Future papers must be conducted in gas stations contaminated to check the main
278 measures adopted for decontaminate the soil and/or groundwater and to prevent health human of gas station
279 workers and neighborhood.

280 With the development of the paper it could be concluded that compliance with the technical requirements
281 required by environmental legislation and the environmental agency as requisite for carried out the fuels resale
282 and other related activities, allows to the gas station A an effective management of environmental impacts of their
283 activities, avoiding the generation of environmental liabilities, which, besides requiring high costs for remediation,
can bring severe negative effects to the environment. ¹



Figure 1:

Figure 2:

284

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1

Activities	Main environmental impacts	Station impacts	Environment impacted
	Emission of VOCs	Fuels discharge	Air
	Fuel spill	Possible products spills in the discharge operation	Groundwater and surface water, soil and air
Fuels receipt	Explosions and fires	Ignition sources handling	People, gas station facilities, residential and commercial establishments adjacent to the gas station
Fuels storage	Emission of VOCs	Underground tanks breather	Air Groundwater and surface water, soil and air
	Fuel spill	Possible holes in tanks and pipes	
	Emission of VOCs	Fuels supply operation	Air
	Fuel spill	Possible products spills in vehicles supply operation, coming from the diesel oil filters, pumps and	Groundwater and surface water, soil and air
Vehicles supply	Residues release	absorbent materials Improper disposal of absorbent materials	Groundwater and surface water, soil
	Explosions and fires	Ignition sources handling	People, gas station facilities, residential and commercial establishments adjacent to the gas station
Gas station equipment and facilities cleaning	Oily waters	Inadequate operation and/or inefficient control of these impacts	Groundwater and surface water, soil
Lubricating products	Fuel spill	Possible products spills in oil change operation	Groundwater and surface water, soil and air
	Residues release	Improper disposal of product empty packages	Groundwater and surface water, soil
Convenience stores	Residues release	Improper disposal of household garbage	Soil
Administrative office	Residues release	Improper disposal of office garbage	Soil

Figure 3: Table 1 :

15 CONCLUSIONS

2

Main Activities	Impacts	Measures to mitigate the environmental impacts
Emission of VOCs		<ul style="list-style-type: none">-Independent breather for each underground tank. The breather is positioned in such a way that it not causes discomfort and allow the vapors dispersion.-Installation of double-walled tanks, constructed according to NBR 13785 and equipped with interstitial monitoring linked to continuous monitoring system;-Installation of anti-overflow valves in the tanks discharge pipe;-Acquisition of flexible and non-metallic underground pipes, in compliance with NBR 14722;-Installation of discharge pipe with waterproof sidewalk chamber and sealed for spills containment;-Sealed discharge installation (adapter nozzle for sealed discharge);
Fuels receipt tanks		<ul style="list-style-type: none">-Installation of watertight and waterproof access chambers to the tanks entrance;-Fuels discharge area constructed in reinforced concrete and provided with drainage directed to the effluent treatment system (oil and water separation box);-Performing of technical report about fuels storage and distribution systems watertight, issued by a company or a qualified professional, accompanied by appropriate ART (Technical Responsibility), carried out every operation license renewal.-Compliance of establishment's operation and maintenance plan, which contains guidelines for verifying the integrity and maintenance of equipments and systems, operational procedures, response plan
Explosion and fires		<ul style="list-style-type: none">-Emergency procedures considering the occurrence reporting to the Fire Department and CETESB, personnel training program covering operational practices, maintenance program of equipment and systems and response to incidents and accidents.
Emission of VOCs		<ul style="list-style-type: none">-Independent breather for each underground tank. The breather is positioned in such a way that it not causes discomfort and allow the vapors dispersion.-Installation of double-walled tanks, constructed according to NBR 13785 and equipped with interstitial monitoring linked to continuous monitoring system;
Fuels storage		<ul style="list-style-type: none">-Installation of anti-overflow valves in the tanks discharge pipe;-Acquisition of flexible and non-metallic underground pipes, in compliance with NBR 14722.
Emission of VOCs		<ul style="list-style-type: none">-Check valve installation in the diesel oil filtration system;-Check valves installation in the supply pumps;
Fuels supply		<ul style="list-style-type: none">-Watertight and waterproof containment chamber installation in supply pumps, which contains liquids detection sensor connected to the monitoring system.
Vehicle Residues		<ul style="list-style-type: none">-Residues dispatch to landfills, correctly licensed. -Compliance of establishment's operation and maintenance plan,
lease		<ul style="list-style-type: none">which contains guidelines for verifying the integrity and maintenance

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15 CONCLUSIONS

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