

# OIL SPILL RESPONSE CENTERS IN BRAZIL – A NEW EXPERIENCE

Luiz Antônio Arroio, Isaac Rafael Wegner, Flavio Torres da Cruz  
PETROBRAS S.A. – Petróleo Brasileiro S. A. – Health, Safety and Environment  
Av. Chile, 65 / 602  
20 031-912 - Rio de Janeiro – RJ  
BRAZIL

**ABSTRACT:** *It has been noticed, in the latest Brazilian oil spill emergencies, that the time of arrival of equipments in the emergency site, due to some different facts (Brazilian dimensions, transport infrastructure, Customs etc) was of 48-60 hours. Furthermore, one may notice that all the Brazilian oil spill response equipment was not enough for Tier 2 and 3 emergencies. Petrobras has decided to install a total of nine Oil Spill Response Centers, strategically located throughout Brazil, thus increasing its response capacity for potential oil spills. Each of the Centers is equipped with special barges, oil recovery boats, skimmers, sorbents, containment and sorbent booms. Equipments and logistic support can be rapidly dispatched to any area in Brazil where an emergency might occur. The CDAs operate with about 250 trained technicians, available 24 hours per day. This provides regularly trained skills, together with Petrobras technicians and the local communities, in order to guarantee readiness in the event of a spill. Some data about how and where the Centers have been working after two years operation are now shown. In fact, the CDAs have been participating in a lot of response calls, although most of them are inspections for prevention, supporting the Petrobras' units operations, other companies' emergencies and occasional oil spills. However, it should be noted that Brazil has more capacity to face oil-related emergencies than before.*

## Introduction

Not considered very important in earlier times, the aspects of health, safety and environment issues cannot be dissociated from the business of any company in today's world. Within this context, Petrobras has planned new corporate HSE directives. These corporate directives are made up of fifteen items whose main goal is a broader approach to managing HSE through a constant improvement process, involving employees and contractors at all levels in the company. One of them, number eleven, refers to Contingency Planning, which requires: "The emergency scenarios shall be predicted, and emergencies must be responded to promptly and efficiently to reduce their impacts" and the Oil Spill Response Centers installed attend this directive.

## Program for excellence in environmental and operational safety management (PEGASO)

The nine Oil Spill Response Centers, called in Portuguese "Centro de Defesa Ambiental – CDA" are located in important

Brazilian regions and they are capable of attending to the main emergencies related to oil spills. The CDAs are capable to attend any area in the country and even the Argentinian, Bolivian and Colombian Petrobras branches, anticipating a demand that will certainly be fulfilled with the increase of oil activities in these regions.

Such investments are part of the Environmental and Operational Safety Management Program, which, from 2000 through 2003 will be spending a total of US\$1.0 billion specifically for: automated supervision of all oil and gas pipelines; cutting down residue and liquid waste by 80%; application and development of new technologies; and obtaining ISO 14000 and BS 8800 certificates for all company units. The total investments for the nine Centers are around US\$ 110 million, US\$ 30 million for equipment and installations and other US\$ 80 million for operation, maintenance and additional services.

## Evolution in logistic

Petrobras keeps E&P operations and refineries in some South American countries, where it will be more and more active. Only within Brazil, its activities are spread throughout 8,5 million Km<sup>2</sup>, of forest, mountain and seaside regions. In order to support such operations Petrobras has created the oil-spill response centers (Centropol – "Centros de Combate à Poluição de Oleo"), which, since the 80's, have given support to local emergencies, dealing only with the resources of the operational unit in question. All the Petrobras operational units with sheltered or open-water activities were part of this structure, namely: Rio de Janeiro, São Sebastião, Salvador, and Angra dos Reis etc.

However, the company's new activity levels have started to demand an even faster logistic structure, decentralized and able, if necessary, to focus all its operational potential in different places, fast and independently. Due to their subordination to specific units within the Company's management structure, the Centropols didn't have such autonomy, nor logistic ability to participate in average and large-scale oil spills.

It has been noticed, in the latest middle-and-large range emergencies occurred in Brazil, (such as Guanabara Bay in Rio de Janeiro, January 2000 and Paraná Refinery - Araucária, July 2000), that the response time concerning the arrival in the site of foreign equipment and local resources was of between 48 and 60 hours.

Furthermore, the difficulties for releasing imported from the International Custom Dept., the large Brazilian dimensions and

the difficulties concerning to a air/ship/land infrastructure was not enough prepared for oil spill response in that quite big area should all be taken into account as serious impairments for an adequate response time.

Also, it must be noticed that, during the latest large-range emergencies, the total amount of necessary equipment and resources was equal or even superior to the total of available in local Brazilian oil-spill response centers (“*Centropol*”), clearly pointing to the urgency of implanting a new oil spill response centers with enough resources to fulfill the needs of the region under its responsibility and cover all the Brazilian territory.

Thus, from the old basic and traditional system, Petrobras has decided to develop the new oil spill response structure, sponsored by the corporate HSE group.

Petrobras has been following the international oil spill response plan based on the Tier Response, and adopted it as follows:

- Tier 1: On site personnel answer at the place of operation (Local Contingency Plan). Sometimes the regional CDA can support the local operations;
- Tier 2: Support by Regional Contingency Plan and the Regional Oil Spill Response Center and the logistic Center in São Paulo state;
- Tier 3: National and/or international aid: other CDAs, Clean Caribbean Cooperative (CCC) and Briggs bases (by contracts) and Oil Spill Response Limited (OSRL).

### Strategic location

The new centers are spread through all of the Brazilian territory, seated in nine different locations, near the company’s main units: CDA Amazonian and its six advanced bases, spread through the Amazon region, supports the local refinery, the storage bases and the fuel transport systems through rivers, as well as the Urucu unit, which extracts oil and natural gas in the heart of the rain forest. CDA Maranhão supports the E&P areas, from the mouth of Amazon River to the seaside of Ceará, also attending to the ground installations in the states of Maranhão and Pará. CDA Rio Grande do Norte supports the offshore Guamaré production areas, and the far-northeast onshore production, including the terminals in Pernambuco state and the refinery in Fortaleza. In the east, CDA Bahia supports the onshore field wells and pipelines of Bahia state, the local refinery Landulfo Alves (RLAM), and the oil terminals, beside all the operations in the states of Sergipe and Alagoas.

In the southeast of Brazil, we find three important Petrobras Units (including 6 of its 13 refineries), and we find three CDAs: in Campos Basin (Macaé-RJ). This supports the largest oil production area in the country. In Rio de Janeiro City, which covers the pipelines and terminals of Guanabara Bay and a big refinery (REDUC) plus the operational units in the states of Minas Gerais and Espírito Santo. In Sao Paulo, we find the Oil Spill Response Center, whose function is to attend terminals, refineries and bases in the state. It is also the national and international logistic center. It is located near Guarulhos International Airport, being thus able to give quick additional support to the other centers in the country in Latin America, further improving the system’s response capacity, whenever needed.

CDA South supports the Itajaí terminal, the production areas of the Southern Region and two refineries in the south zone: REFAP and REPAR. In the city of Goiânia, central region of Brazil, we

find the CDA Center West and its advanced base in Uberaba, responsible for the support to the regional pipelines, including the Brazil-Bolivia gas pipelines. The map below shows the advanced base and all nine CDAs in Brazil.

### Permanent improvements

In the first stage is to be a third party venture. Competition was opened in September, 2000. Five companies with international expertise in this type of activity took part in the competition.

The partner chosen by Petrobras to operate the CDAs shall do so for the next five years. The Centers are equipped with the different types of oil spill response equipments and materials:

- 70,000 meters of several types of containment booms (offshore, shorefence, permanent etc);
- 7 Elastec fire boom systems, 1000 ft each one;
- 4 Nofi Current Buster systems for collecting oil in up to 4 knot currents, distributed through to regions with rivers;
- 6 Weir boom systems with 370 meters for 180 m<sup>3</sup>/h and 210 m<sup>3</sup>/h recovery rate for offshore areas;
- 100,000 meters of absorbent boom and 85,000 absorbent mats;
- 38,000 kg of Oil Gator bioremediation agent for shoreline clean-up
- 180 different oil skimmers (weir, drum, oleophilic and brush) including 13 High Volume Skimmers;
- 8 Enviro-Cat oil recovery boat;
- 34 support boats and barges,
- 28 Hydraulic Submersible pump packages (150 m<sup>3</sup>/h) for sunk viscous oils and explosive atmospheres;
- 100 oil pumping systems;
- 380 temporary oil storage devices (5, 10 and 15 m<sup>3</sup>);
- 50,000 liters of chemical dispersants and 15 units for dispersant application,
- Devices for cleaning up oiled shorelines;
- Communication equipment.

All of this inventory can be quickly mobilized to fight emergencies in any part of Brazil in max. 8 hour for a 400 km distance, and 24 hour for any distance. What’s more, each CDA has available an assortment of vehicles, boats and airplanes belonging to the region itself, pre-hired and at service, to be immediately called in case of accident.

A total contingent of 250 employees (technical or graduate level) will be operating in the CDAs. Basically, they consist of ex-employees of Petrobras, ex-members of the Brazilian Merchant Navy and professionals with knowledge of the region in question. This group of specialists is apt to coordinate emergency-recruited staff in case of need.

Scottish technicians from Briggs are conducting a training program for CDA and Petrobras technicians, which includes simulated-emergency exercises, aimed at enhancing the integration of everyone involved and decreasing the emergency-response time. Another task of these professionals is analyzing oil spreading and preparing sensitivity maps, in order to anticipate measures to be taken according to the type of accident.

Petrobras is also associated to Clean Caribbean Cooperative for Level 3 emergencies, and they have been called for Petrobras for the Guanabara Bay and the Parana accidents. The CCC has trained 50 Petrobras professionals in its Florida installations.

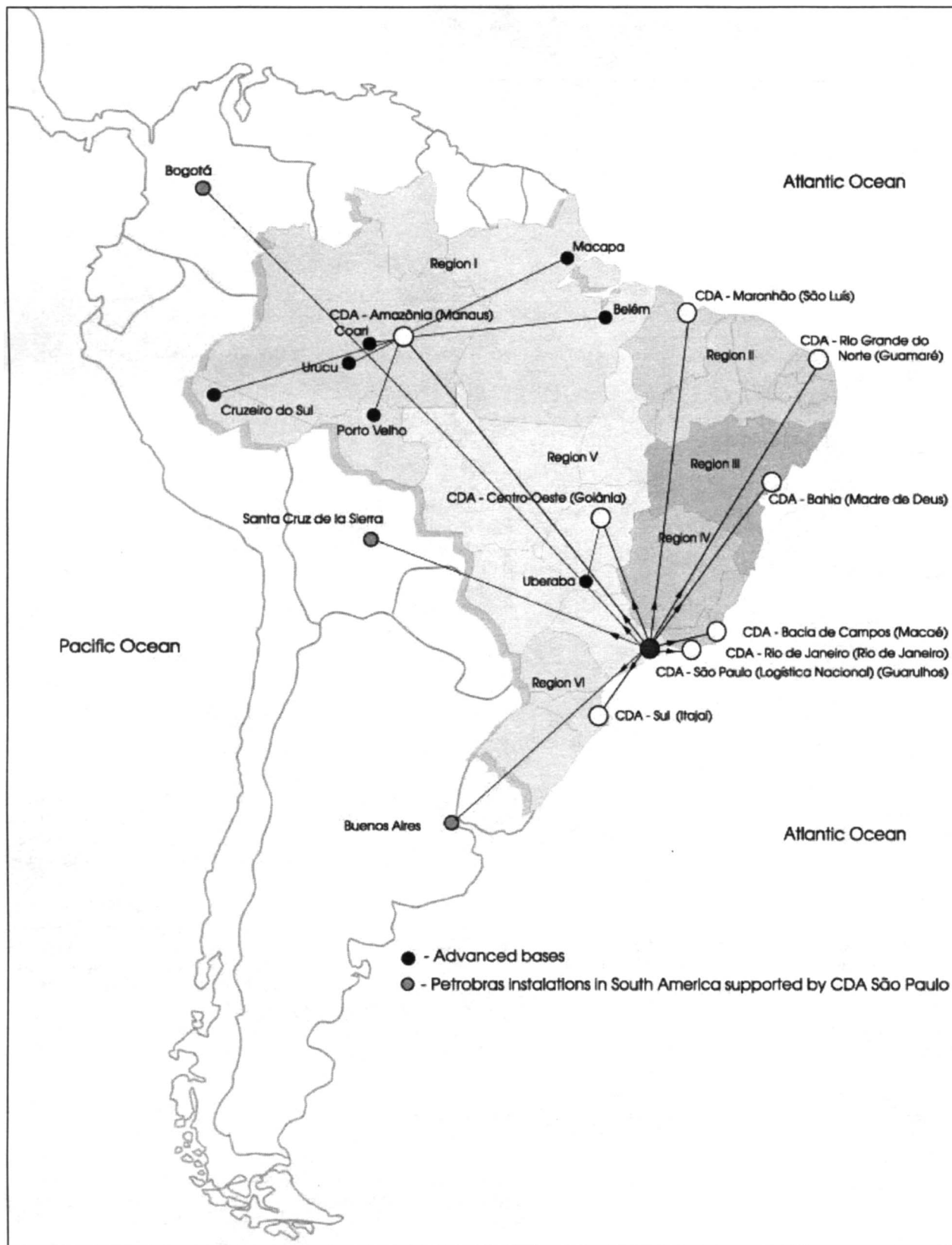
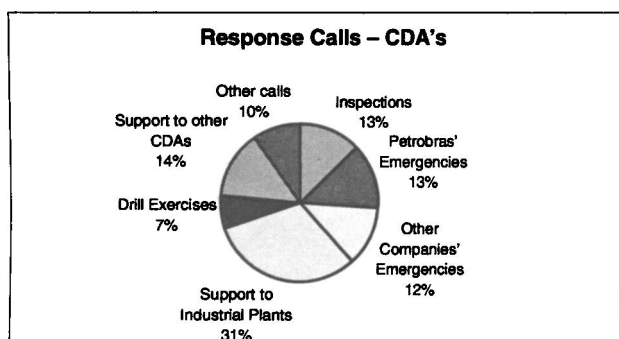


Figure 01. Oil spill response centers location.

Table 1. Oil spill response centers – response calls since 2000, December.

<i>Response Calls – CDA's</i>	<i>RJ*</i>	<i>BC</i>	<i>MA</i>	<i>CO</i>	<i>Sul</i>	<i>BA</i>	<i>AM</i>	<i>SP</i>	<i>RN</i>	<i>TOTAL</i>
Inspections	37	2	1	0	0	4	2	2	0	48
Petrobras' Emergencies	6	8	2	2	6	12	5	6	3	50
Other Companies' Emergencies	14	1	0	1	5	12	8	5	0	46
Support to Industrial Plants	61	4	1	3	2	38	5	3	1	118
Drill Exercises	7	4	0	0	3	2	3	6	0	25
Support to other CDAs	9	4	1	13	6	3	0	16	0	52
Other calls	2	2	2	2	2	3	8	16	0	37
<b>TOTAL</b>	<b>136</b>	<b>25</b>	<b>7</b>	<b>21</b>	<b>24</b>	<b>74</b>	<b>31</b>	<b>54</b>	<b>4</b>	<b>376</b>

Note: (\*) RJ = Rio de Janeiro, BC = Campos Basin, MA = Maranhão, CO = West Center, Sul = South, BA = Bahia, AM = Amazon, SP = São Paulo, RN = Rio Grande do Norte.



Graphic 01. CDAs response calls.

### CDAs in action

The basic activities of the CDAs are oil spill response and environmental services, as well as:

- Keeping all the equipments and teams ready for operation;
- Oil spill response on Tier 1, 2 and 3 spills;
- Response times: 2 hours for a distance of 20 km; 8 hours for a distance of 400 km; 24 hours for any distance;
- Training: 1 Operational exercise (Tier 1) for each CDA every 2 months, Tier 3 drill exercises – one per year; Mobilization Exercises – one per year each CDA; Oil Spill Response Commander Courses (5 days) – every year.
- Cleaning up shorelines;
- Corrective and preventive maintenance of all Oil Spill Response Centers Equipment and all Petrobras' Equipments (Tier 1);
- Keep spare parts available in the Centers for pumps, booms, oil skimmers, etc.
- Prepare Sensitivity Maps and Risk Assessments focusing on oil spill response for CDA's area of responsibility;

The CDAs have an additional support function, complementing the local contingency plans already established in each operational unit, which have their own resources for fighting oil spills, as well as a permanently alert contingent. However, when a spill surpasses the local capacities new system stars acting.

The CDAs have been in full operation since December 2000, with more than 370 calls. A hundred or so are very small, medium oil spill emergencies or helping to control accidents

concerning other companies, some of them out of the oil industry. In the beginning of 2001.

Since CDA Rio de Janeiro has begun its operations, it has attended a lot of small-unidentified oil slicks in Guanabara Bay. Also last year, in the state of Sao Paulo, they supported the recovery of an oil-spill in a large metal/cement conglomerate factory. In the state of Santa Catarina, they responded to another spill, which occurred in a big fabric company. In the case of third-party responses, the operational costs are to be covered by the individuals requesting assistance.

The general data, from the beginning of operations until August, 2002, is shown below:

### Petrobras CDAs and other companies associated

The market opening in the Brazilian petroleum sector has caused a large increase in the E&P local activities. Many companies have increased mine exploration on the Brazilian continental platform for a couple of years and, soon, will produce and trade oil on a local basis. The same is happening on the west coast of Africa, where the geological characteristics are similar to Brazil's.

It is a natural trend that other oil companies come join the Petrobras CDA system, in order to share the operational costs and have all resources and services available. This association is done with Petrobras' approval, and assumes payment of adhesion and maintenance taxes, calculated according to the operational risks. The emergency operations are charged proportionally. Until now, Petrobras has agreed to an association with some oil companies and is in discussion with other oil companies operating in Brazil.

### Conclusions

In fact, the CDAs have been attending, in Brazil, a lot of response calls, but most of them are inspections for prevention, support the Petrobras' units operations, other companies' emergencies and some oil spills, but the most important point is that Brazil has more capacity to face the main oil-related emergencies than before.

The CDAs system tends to become an environment-safety cooperative system, specific to South America and South Atlantic region attending oil companies. This strategy fits the development

aim of Petrobras in South America being in operation in Argentina, Bolivia and Colombia.

In order to keep the system working with readiness and efficiency we are still purchase high tech equipments in the international market.

### Reference list

1. Arroio, L.A. e Filho, L. Igrejas, CDA - Centro de Defesa Ambiental da Petrobras, Congresso anual da Associação Brasileira de Prevenção a Acidentes (ABPA), 2001;
2. Petrobras Magazine, Vol 07, No. 32 – Environmental Safety Complex, 2001.
3. Alpina Briggs Defesa Ambiental, monthly reports

