

PUBLIC MINISTRY OF THE STATE OF SÃO PAULO

PROSECUTION OFFICE OF JUSTICE OF THE ENVIRONMENT OF THE CAPITAL

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SAO PAULO, DECEMBER 28 , 2005.

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Dear directors:

I'm directing copies of the report which was sent to the  
Municipal Vigilance as requested in the e-mail to this Prosecution Office of Justice.

And I take the chance to renew the protest of regard and  
respect.

PATRÍCIA MORAES AUDE  
Justice Prosecutor of the Environment

Dear Sirs

CESAR AUGUSTO G. PEREIRA, VALDENIR DA CRUZ SANTOS and REGINALDO  
INÁCIO CARVALHO.

DD. Directors of SIPETROL – SP  
04110-000 – Rua Carlos Petit, n 261  
Phone: 5549-1244  
São Paulo – SP  
/aj

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Rua Riachuelo, n 115 – 1 andar – sala 47  
Tel: 3119-9000 – 3119-9102 – Cep 01007-007  
e-mail: [pjmac@mp.sp.gov.br](mailto:pjmac@mp.sp.gov.br)

Municipal Office of Health  
Coordination of Health Guard  
Administration of Environmental Health

## **SHELL CONTAMINATED AREA IN VILA CARIOCA**

### **PARTIAL REPORT**

#### **PRESENTATION**

The aim of this report is to show in a brief way the valuation of the environmental exposure and the risks and health effects to the residents of Vila Carioca related to the company SHELL there installed. It's a preliminary valuation involving part of the detailed information about health and the environment which will have a specific and complete report. It consists of:

1°. Preliminary analysis of the partial results of the executed work by the Health Municipal Office in relation to the "Work Plan" developed by SETOX/CVS with the technical assistance of the toxicologists. (Enclosed 1). It refers to the one carried out up to July 05<sup>th</sup>, 2005.

2 °. Compared studies of death rate in the area of Vila Carioca and the Administrative District of Ipiranga in the period of 10 years from 1994 to 2003 concomitantly done with the previous one from the information about the mortality of the Improvement Program of Mortality Information – PROAIM. (Enclosed 2). This epidemiologic investigation strengthens the first ones in the first and provides subsidies in the proper measures of control in different standards.

The impact in health related to Shell happens in two distinct kinds of environmental contamination related to the activities of formulation of chemicals and storage of oil, the formulation of industrial detergents, storage and distribution of fuels.

# **VALUATION OF THE ENVIRONMENTAL EXPOSITION, THE RISKS AND THE HEALTH EFFECTS**

## **1° PRELIMINARY ANALYSIS OF THE PARTIAL RESULTS OF THE EXECUTED WORK BY THE MUNICIPAL OFFICE IN RELATION TO THE “WORK PLAN” DEVELOPED BY SETOX/CVS**

### **1. INTRODUCTION**

The preoccupation about the possible ANOMALOS results of the exams that show the exposition and the effects to the health and the necessity of immediate health attitudes as well as the identification of the epidemiologic situation of exposure/contamination of the residents directed us to anticipate the elaboration of the current and partial report through the difficult accomplishment to the “Work Plan”. It consists of the preliminary analysis of the partial results of the indicated exams of exposure and the health effects.

The difficulty of accomplishing the Plan initiated in October 2003 is principally:

- To the low adhesion of the population in target in realizing all the steps of the protocol registered in 32,6% which was made lots of attempts to increase with domicile inspections and convocations by the organized society and also the local press.
- To the time of typing of the dictionaries due to their size and difficulty of reading of the open questions, causes the everyday efficiency of typing of 5 questionnaires / typist.

The serious effects to health characterized by neurological reasons, hepatic, renal, cardiovascular, ENDOCRINO, reproductive, MUTAGENICO, TERATOGENICO, CARCINOGENICO related to the cited products in the Plan will be detailed in the final report.

In this report will be approached some aspects of use and possession of the soil, the functioning of the Division of Chemistry of Shell Brasil S/A, physical characteristics, chemistries, behaviors and toxicologists of the chemicals aldrin, dieldrin, DDT and DDE, preliminary results of the carried out exams with the residents of the place and guiding proposals.

#### **1.1 – DESCRIPTION:**

##### **1.1.1. LOCALIZATION AND CHARACTERISTICS OF THE USE OF THE AREA**

This place presents a mild topography situated in the cultivated plain in Tamanduateí River near to the Córrego dos Meninos in the south-east of São Paulo in Ipiranga. In this place some floods happened until 1990. (Map 1)

Up to 1968 the paving was precarious and the access to the lakes was free. Those lakes were used by the local people as an area of leisure and fishing. From 1968 on these lakes were covered with lots of rubbish, trash and also wrapping of chemical products.

SABESP installed drinkable water between 1955 and 1959 but the residents say that the providing was irregular for this reason since 1985 people used water from the local well. The condominium Auriverde used the mixed supply of SABESP and from the deep well from 2000 until 2002 as the information of the place.

### **1.1.2 SHELL BRASIL S/A**

In the decade of 1940 Shell Brasil S/A established its Industrial Park of the Chemical Division. The land is situated in a mixed area (residential and industrial).

BIP I is situated at 2028 Auriverde Street and BIP II at 6351 Presidente Wilson Avenue.

BIP I has an area of 188.360 square meters. However, 147.860 square meters of this land is used for storage of hidrocarbonetos from petroleum and 40.500 square meters where are situated old installations of the offices “area Colorado” and it has been working since 1940. The Colorado’s area was used as a club until 1972 when lent this place for the production of the composition of “Matabicheira” made of organofosforados diclorvos and clorfenvinfos but shut down and transferred for BIP II in 1976. From 1976 to 1977 this place was as the administrative headquarters and then was shut down. In this area the main substances are : benzene; xileno; toluene; NAFTA leno; 1,2,4- trimetilbenzeno; 1,2-dibromo-3-cloropropano; 1,3,5-trimetilbenzeno; 1,1,2-tricloroetano; 1,2-dicloroetano (cis e trans); tricloroetileno; acetone; phenol; ciazina; DDD;DDE;DDT; etilbenzeno; simazina;BHC; lead, toxafeno, barrio, arsenic and copper.

In 2001 the company Esso Brasileira de Petróleos Ltda (Brazilian Esso of Petroleum) came into possession of 36,63% of the area operating in the policy “pool” administrated by Shell Brasil S/A.

BIP II was used in the period of 1940 and 1980: 1) for the distribution of derived of petroleum and was also a garage of maintenance of railway cars from 1940 until 1958 and, 2) Since 1958 to prepare the agrochemicals clorados and other ones around 5000 to 6000 tons per year and in 197 the activity was transferred to Paulínia (São Paulo). The active ingredients manipulated in this area were: aldrin, dieldrin, endrin, malation, DDT, fosdrin, diclorvós, clorfenvinfos, toxafeno, nemagon, planavin, telodrin, monocrotofós, oxicloretos of copper, metal parathion, BHC, tetraclorinfos, dodecacloro.

## **1.2 PHYSICAL CHARACTERISTICS, CHEMICALS AND MANNERS OF: DDT, DDE, ALDRIN AND DIELDRIN**

### **DDT**

C<sub>14</sub> H<sub>9</sub> Cl<sub>5</sub>

(1, 1, 1- tricloro-2, 2-bis (p-clorofenil) etno)

### **DDE**

C<sub>14</sub> H<sub>8</sub> Cl<sub>4</sub>

(1, 1-dicloro-2, 2-bis (p-clorofenil) etileno)

\* High molecular weight (DDT PM = 354, 49; DDE PM = 318, 03),

\* Little hydro dissolvable (DDT 0,025 mg L<sup>-1</sup> DDE 0,12 mg L<sup>-1</sup> 25°C), dissolvable in lipids and organically solvents.

\* They are linked strongly to the sediment and also being very immovable in the majority of the soil and they are rarely leached to deeper layers of soil and to subterranean water (coefficient of the parts DDT = 6, 9; DDE = 6, 5),

\* Highly persistent in the environment they suffer bio accumulation and magnificação trófica.

\* They can be bio aerobic or anaerobic degraded and being degraded by fotolise. However these methods happen very slowly. The products of degradation of DDT are the DDE and the DDD. The DDD was synthesized as insecticide while the DDE has never been synthesized for commercial purposes being its presence in the environment related to the degradation of DDT or by the impurity in the DDT. In the animal organism the DDT is initially degraded to DDE and DDD which are stored in the tissue rich in fat. These compounds are slowly transformed in bis (diclorofenil) acetic acid (DDA). The DDA or conjugated as DDA are easily released in the urine. The DDE is the most persistent in the organisms therefore it is an indicator of exposition to DDT.

\* Can be volatized of the sediment; DDE easier than DDT (DDT vapor pressure – PV = 1,6 X 10<sup>-7</sup> mm Hg – 25 °C; DDE PV = 6,0 X 10<sup>-6</sup> mm Hg - 20°C) and can be transported associated by particles of clouds of dust to other places.

## ALDRIN

C<sub>12</sub> H<sub>8</sub> Cl<sub>6</sub>

(1,2,3,5,10,10, hexachord – 1,4,4<sup>a</sup>,5,8,8<sup>a</sup> - hexaidro 1,4-enco-exo-5,8- dimetano-naftaleno).

## DIELDRIN

C<sub>12</sub> H<sub>8</sub> Cl<sub>6</sub> O

(1,2,3,4,10,10-hexacloro-6,7-exoxi-1,4,4<sup>a</sup>,5,6,7,8,8<sup>a</sup>-octahidro-1,4-endo,exo-5,8-dimetanonaftaleno)

- High molecular weight (PM dieldrin = 380,91; PM aldrin = 364,93),
- Stable in the alkaline agent and in the weak acid agent. It decomposes slowly when it is exposed to the solar light.
- Little hydro dissolvable moderately dissolvable mineral oils and lots of dissolvable in aromatically solvents halogenated.
- They linked strongly to the sediment and are rarely leached to deeper layers of soil and subterranean water (coefficient of aldrin = 6,5; dieldrin = 5,4).

- Highly persistent in the environment (low levels of dieldrin have been detected in places of more than 10 years after the treatment) suffer bioaccumulation and trófica magnification.
- Can be volatilized of the sediments (PV dieldrin =  $5,8 \times 10^{-6}$  mm Hg – 25°C; PV aldrin =  $1,2 \times 10^{-4}$  mm Hg - 25°C) and transported associated by particles of clouds of dust to other places.
- Not combustible e not corroded.
- Aldrin metabolizes quickly in dieldrin by oxidation in animals and plants as rarely are found residues of aldrin in food and animals being considered dieldrin as an indicator of exposition of aldrin.

### **1.3 WAYS OF EXPOSURE**

The principal way of taking it is orally by swallowing principally of water, food obtained by plants or animals which live in contaminated areas. The exposure can occur when in contact with contaminated water or soil especially when there is the mobilization of the composition or of their metabolites by remedies, re-suspension of sediments or erosion. Even the exposure of breathing in can cause in treated places with the products because these compositions may exist even in the vapor way as particles which are in the atmosphere.

The residents used water of wells to drink, to prepare their food and even to take their shower. There are vegetables, fruits and animals which are eaten by the residents.

## **2. WORK DEVELOPMENT**

### **2.1 METHODOLOGY**

Following the SETOX Plan of Work, the UBS Dr. Joaquim Rossini has done the proceedings:

- Number of properties visited: 890 ( 289 closed / refused / vacant )
- Number of properties worked : 601
- Number of questionnaires filled : 522 ( people who were selected according to the plan)
- Number of residents that came to the medical advice: 393 (75,3% of the total who were selected).
- 238 (45,6% of the total that were selected) have had the analysis of biomarkers of effect and/or exposure according to the distribution on the map 2 enclosed.

- 198 (37,8% of the total that were selected) have had exams of chlorides insecticides, lead (Pb) and manganese (Mn) in the blood.
- 210 (40.2% of the total that were selected) have had exams of arsenic (As) and mercury (Hg) in the urine.
- 170 (32,6% of the total that were selected) have had blood and urine exams. The sample of blood for the Pb and Mn analysis of 1 case coagulated and the exam will be repeated.

The adhesion to all the proceedings about the Plan was of 32,6%. In the last attempt of recruitment to take part in the Plan in the period of April to June 2005 obtained 4 more people to participate and 8 people that didn't complete all the stages.

## 2.2 CHARACTERIZATION BY SEX AND AGE

The quantity of male and female who had the exams is very similar:

Sex	Number	%
Female	121	50,8
Male	117	49,2
Total	238	100

The age was characterized according to the population of studies determined in the Plan as: residents under 10 years old and people who are more than 50 years old; workers; former workers and consumers of well water of the Condominium Auriverde of any age.

Age	Number	%
< 10 years old	23	9,7%
10 to 50 years old	61	25,6
> 50 years old	149	62,6
ignored	5	2,1
total	238	100,0

## 2.3. ABOUT THE ANALYSIS OF THE BIOMARKERS:

The exams were done by the Institute Adolfo Lutz – IAL.

The analysis of the specific exams indicating exposure / the effects have as a difficulty the inexistence of values of reference to the environmental exposure to the contaminants: Organoclorados Pesticides, Mercury, Arsenic, Manganese. To the lead 10mcg/dl is the quantity for measures of control established by CDC in the children's case. For the understanding of the obtained results we searched in the literature of the work with the values of reference about the population that was not exposed and we adopted the values to contrast according the following graphic:

<b>Exams of the laboratories: Indicators of Exposure and/or effects</b>					
<b>Product</b>	<b>Material</b>	<b>Unit</b>	<b>Limit of quantity</b>	<b>Method</b>	<b>Value of reference</b>
As (III,V,MMA,DMA)	urine	mcg/l	2	Spectrometry of atomic absorbing with hydrates producer	<50mcg/l urine without eating fish normal up to 200 mcg/l urine 7mcg/dl – blood
Hg	urine	Mcg/l	2	Spectrometry of atomic absorbing with vapor producer	In the blood: 5 mcg/l in the urine: 0,5 mcg/l (2)
Pb	blood	Mcg/l/dl	2	Spectrometry of atomic absorbing with graphite oven	10mcg/dl children 20 mcg/dl adult (3)
Mn	blood	Mcg/dl	1	Spectrometry of atomic absorbing with graphite oven	2 to 8 mcg/dl blood 0,1 to 0,8 mcg/dl - urine
Organoclorados Pesticides			mcg/dl blood	ng/g fat	Manual of analytical methods for the analysis of pesticide residues in human and environment samples; USEPA, environmental toxicology Division. Research Triangle Park, N.C. 27711 ( with adaptations)
hexaclorobenzeno	Serum	Mcg/dl	0.04	50	
Alfa HCH	Serum	Mcg/dl	0.04	50	
Beta HCH	Serum	Mcg/dl	0.08	100	
Gama HCH	Serum	Mcg/dl	0.04	50	



Aldrin	Serum	Mcg/dl	0.04	50	
Dieldrin	Serum	Mcg/dl	0.08	100	0,14 mcg/dl serum
Eldrin	Serum	Mcg/dl	0.08	100	
Heptaclor	Serum	Mcg/dl	0.04	50	
Heptaclor epoxy	Serum	Mcg/dl	0.08	100	
Op'DDE	Serum	Mcg/dl	0.16	200	
Pp'DDE	Serum	Mcg/dl	0.08	100	118 (101 to 137) adolescent (12 to 19 years old) 297 (267 to 330) adult (20 and +) 260 (234 to 289) total (6) ng/g fat
Op'DDT	Serum	Mcg/dl	0.16	200	
Ppddt	Serum	Mcg/dl	0.16	200	

1. ATSDR, 2000
2. Lawyers, 1986, in CRA publications
3. CDC
4. OMS, 1999
5. Baselt and Cravey, 1989, in Meditext
6. 2<sup>nd</sup> National Report on Human Exposure to Environment Chemicals, CDC, Jan 2003

### 3. THE PRESENTATION OF THE RESULTS

Environmental analysis of the soil showed the presence of DDT, DDE aldrin and dieldrin and other contaminants. These contaminants were detected in the subterranean and soil water.

The environmental data which we have known up to now show the residents of Colorado Street and Auriverde Condominium with the most risk of exposure and contamination.

#### 3.1. ORGANOCLORADOS PESTICIDES

Has been detected organoclorados pesticides dieldrin and pp'DDE.

The concentration of organoclorados pesticides generally increase when people get older and women have slightly less than men.

The fat tissues and the milk reflect the background of the exposure while the blood is a better indicator for the recent exposure.

The organochloride pesticides were formulated with organic solvents which as they are breathed in could also cause pneumonia.

3.1.1. Dieldrin was detected in three people over 60 years old according to the graphic:

<b>Dieldrin</b>	<b>Frequency/ age</b>
0.08	1/ 64.9 years old
0.16	1/ 62.2 years old
0.19	1/ 60.3 years old
Total	3

According to the information of the questionnaire and the doctor's record:

Case 1: 66 years old, female, businesswoman, has been living in this place for 32 years, used the water of the well to drink and ate vegetables of this place. She had a nodule in her breast in 1992. She has problems on her bones. She presents a hormonal profile thyroid compatible with hipertireoidismo and hipercolesterolemia. Concentration of dieldrin in serum: 0.08 mcg/dl.

Case 2: 63 years old, male, businessman, has been living in this area for 56 years, used the water of the well to drink, cook, to shower and to water. Ate fruits, chicken, pork and eggs of this place. He had hepatitis. He had cardiac revascularization in 1995. He has had sexual impotency for 10 years and he has had diabetes for 2 years. Hipercolesterolemia. Concentration of dieldrin in the serum: 0.16 mcg/dl.

Case 3: 61 years old, female, housewife, has been living in the area for 55 years and at the current address for 20 years. She used water of the well to drink, cook, to shower and to water. She ate vegetables, fruits, meat and eggs of this place. She has had hipotireoidismo for 4 years and she has a treatment using Puran. Concentration of dieldrin in serum: 0.19 mcg/dl.

### 3.1.2. Pp'DDE

There was an analysis and from 198 people who took part in it 73 (36,9%) of them had pp'DDE. From these people 38 (52, 0%) presented a level above the one used for the comparison (234 mcg/g fat).

Between the children and adolescents 4 of them aged from 7 to 13 years old were detected pp'DDE and one of them lives in Auriverde Condominium and 3 live on Colorado Street. It was verified that the level of pp'DDE increases with the age ( $p < 0,05$ ).

The profound study of the analysis will be possible with the typing and the conclusion of all the information.

#### 4. CONCLUSIONS:

According to the presented, we conclude that:

- There was exposure and contamination from DDE and DDT.
- There was exposure and contamination from dieldrin.
- The not detection of contaminants in the serums analyzed doesn't mean the exposure in the past and also the risk of having more effects because they can be in the organism below the limits of detection and quantity of the method of analysis determined.

### **2°. COMPARATIVE ANALYSIS OF 10 YEARS OF MORTALITY BETWEEN THE VILLAGE OF VILA CARIOCA AND THE DISTRICT OF SAÚDE IN IPIRANGA IN THE CITY OF SÃO PAULO, FROM 1994 TO 2003.**

#### **1. INTRODUCTION**

A razão de Mortalidade Estandarizada – RME (The reason of mortality standardized) has been used to compare the mortality in different groups of the population since 1786. The RME compares the number of deaths like in a court (segment of a defined population) with an expected number of deaths or disease obtained with standardized taxes to a population according to the structure of ages.

In its typical application the RME is used to compare mortality in a court with the population in general considering all the deaths or specific causes of death. There are no guarantees that this proceeding of calculation identifies that those diseases or death causes in outrage are associated with a specific exposure. The identified diseases as happening in outrage must be studied in details for elucidation of the etiology.

As an advantage the RME can be applied to small samples which the statistic meaning is an important matter. Technically the use of the “chiquadrado” to calculate the value of the probability of the association requires at least a number of observed events more than 10.

#### **2. METHODOLOGY**

The information of mortality in Ipiranga – São Paulo was collected from the - PROAIM Programa de Aprimoramento de Informações de Mortalidade (Program of Improvement of Information of Mortality) in the period of 1994 to 2003. In 1994 and 1995 the International Codification of Diseases used by PROAIM was CID – 9 and from 1996 CID – 10. The information of diagnostic of a basic cause in the period of 1994 and 1995 was transformed in CID – 10 to permit the creation and analysis of only one bank with single information. The obits were considered by the residence place identifying the ones in Vila Carioca – São Paulo in an area of 1000 meters. The other residence places were classified as belonging to the district of Ipiranga. Vila Carioca has the following delimitation: The South by Shell

Company; the North by Vila Independência; the West until Marciel Street/Parente/ slum Heliópolis and the East by the CPTU railway station (map 3).

The data of the population of the Census of 2000 were geo referenced to permit the calculation of the rates in the chosen areas (Mortality and RME).

The basic obit causes were compared by local residence areas in Vila Carioca with the areas of the district of Ipiranga assuming that there is homogeneity in the social and economical aspects in all the area.

The comparison of the basic obit causes was made from RME as the formula:

$$RME = \frac{O}{E}$$

Where: O corresponds to the total number of deaths observed and E to the number expected of deaths.

To permit the calculation of the Interval of Reliance of 95% (IC95%) was used the Standard Error (EP- Erro Padrão) as required by the Pan American Organization of Health – OPS:

$$EP = \frac{RME}{\text{Observed Deaths}}$$

$$IC95\% = RME + (1,96 \times EP)$$

The amount of P was stimulated from:  $X = 2[0 \frac{1}{2} - (E \frac{1}{2})]$

The RME were worked out as the big groups of diseases of CID – 10 and also for specific pathologies that could be related to the pesticides produced by the company before it was shut down or to the storage of fuel. There were also evaluated some death causes which are complaints of the population in the area of observation. There is a list of specific causes of death and the contaminants which could be related as the evaluation of publication of ATSDR.

Diseases which could be related to the exposure of organoclorados pesticides and solvents:

Anemia aplastica – CID-10 from D60 to D64

Diseases of the endocrine system – CID – 10 from E00 to E35

Diseases of the liver – CID – 10 from K70 to K77

Diseases which could be related to the exposure of lead:

Brain vascular diseases and hypertensive – CID – 10 from I10 to I15 and I60 to I79

Nephrite and Renal insufficiency – CID – 10 from N10 to N19

Diseases which could be related to the exposure of benzene as contaminant of fuel:

Leukemia – CID-10 from C91 to C95

Diseases which could be related to the exposure of arsenic:

Skin Cancer – CID-10 from C43 to C44

Other searched pathologies which can be caused by secondary effects related to the chemical products or that were complaints of the population:

Diseases of the heart – CID-10 from I20 to I52

Breast Cancer – CID- 10 C50

Lungs Cancer – CID-10 C34

Problems of the nervous system – CID-10 from Q00 to Q07

Extrapyramidal diseases and problems with the movements- CID-10 from G20 to G37

The rates of general mortality were worked out standardized by the direct method as a standard population the European population as a proposal by Waterhouse et al, 1976 for the comparison between Vila Carioca and the district of Ipiranga.

### 3. RESULTS

In the period of 1994 to 2003 had a total of 8112 obits in the area and 687 in Vila Carioca and 7425 in Ipiranga. The distribution of the deaths as groups of elderly people was statistically different. The population of Vila Carioca worked out from the rates of 2000 was 6538 people and 92325 remaining from other areas of the district. The first graphic presents the distribution of the events by sex and age 40, 8 are from the feminine sex, 59,1% are masculine and 0,1% is ignored which follows the worldwide tendency of the biggest number of deaths between men.

First Graphic: Distribution of deaths in Vila Carioca and the rest of the district as sex and age – Ipiranga, 1994 to 2003.

AGE SEX	VILA CARIOCA			IPIRANGA		
	FEM	MASC	IGN	FEM	MASC	IGN
0 to 4	20	27	1	146	174	2
5 to 19	2	9	0	21	72	0
20 to 44	23	82	0	159	566	0
45 to 64	50	112	0	481	883	0
65 to 79	86	111	0	1149	1403	0
80 +	99	65	0	1406	963	0
<b>TOTAL</b>	<b>280</b>	<b>406</b>	<b>1</b>	<b>3362</b>	<b>4061</b>	<b>2</b>

Source: PROAIM

The rate of mortality in Vila Carioca standardized by the European population was: 13,9/1000/year bigger than the rest of the district: 7,8/1000/year.

Discriminating from RME by big groups of CID-10 the reason which contribute to this difference (Graphic 2) the diseases of the digestive system, infections and parasitoids, outside causes, endocrine, circulatory system, respiratory system and tumors.

Second Graphic: Reason of mortality standardized (RME) from Vila Carioca and Ipiranga as big groups of International Classification of diseases – CID10. Ipiranga 1994 -2003

CID GROUPS	RME	ICLS	ICLI
Infections and parasitoids	216,6	275,4	157,8
Tumors	144,0	170,7	117,3
Endocrine diseases	176,9	244,9	108,8
Mental diseases	214,0	384,6	43,5
Nervous system	76,9	144,3	9,5
Circulatory diseases	171,9	194,0	149,7
Respiratory diseases	168,9	207,1	130,7
Digestive system	223,0	288,8	157,1
Genital diseases	168,7	257,1	80,3
Prenatal diseases	120,4	166,6	74,1
Outside causes	189,0	231,3	146,6

ICLI – Interval of Trust Inferior Limit

ICLS – Interval of Trust Superior Limit

\*\*p<0, 05

About the possible factors of exposure reported in Vila Carioca the diseases of the Digestive System, Endocrine and the Circulatory System need more attention.

Diseases of the blood, congenital badly formations, hurt and poisoning presented insufficient number to the application of the method. The other causes of death of CID-10 were not found in Vila Carioca.

Evaluating the specific causes of deaths selected for the study in Ipiranga (Graphic 3) the disease of the liver points out. Although there is the alcoholic hepatitis (33% of the group in Vila Carioca) this group of diseases needs to be more investigated.

The diseases of the heart, brain arterial and hypertensive are really important but had presented interval of trust in the inferior limit around 100 the endocrine diseases presented a lot in Vila Carioca when compared to Ipiranga having the hypotheses of the effects of the organoclorados as endocrine ruptures. The numbers were insufficient to consider the results of the breast tumor, skin cancer, nephrite, nephritic syndrome and degenerative diseases. The other specific diseases were not found in Vila Carioca.

Graphic 3. Reason of the Standardized Mortality (RME) in Vila Carioca and Ipiranga as some causes of the International Classification of diseases:

Groups of CID	RME	ICLS	ICLI
Congenital badly formations	263	425,7	100,3
Arterial Brain and tension I10 – I15 and I60- I79	151	185,3	116,7
Arterial brain I60- I79	135	170,3	99,7
Liver K70- K77	300	419,7	180,4

Endocrines E00- E35	174	247,1	102,1
Heart I20 – I52	175	202,4	147,6
Nephrite and Renal insufficiency; N10- N19	195	323,0	68,2
Breast tumor	120	198,4	41,6
Lungs tumor	140	212,5	67,5

- Insufficient number of events to the use of the method

ICLI – Interval of Trust Inferior Limit

ICLS – Interval of Trust Superior Limit

\*\*p<0, 05

#### 4. CONCLUSIONS:

It needs to make a profound study of the population emphasizing the pathologies which are the principal causes of death in Vila Carioca trying to find the etiologic factors and establishing a precocious treatment.

According to the study of the mortality the tax of mortality in Vila Carioca is bigger than in Ipiranga. Comparatively the digestive deaths point out and there are lots of deaths caused by hepatic diseases.

The deaths of endocrine causes are very big as well and it is associated to the effect of clorados like endocrine ruptures.

It was checked that two people that have dieldrin detected in their serum don't have the function of the thyroid gland. We do not have the analysis of the anamneses to verify the prevalence of the endocrine diseases in the residents attended as according to the "Work Plan".

#### LEADINGS

The products aldrin, dieldrin, DDT and DDE are compound highly by persistent in the environment which absorbs strongly to the soil with a low solubility and very dissolvable in oils and organic solvents and also with a very slow tax of degradation and bio degradation. They are also passable of bio accumulation and trofica magnification. The people who suffered the direct or not direct exposure can assimilate the metabolic compounds accumulating in their organisms and can have health problems.

In this area were detected organoclorados pesticides like aldrin, dieldrin, DDT and DDE on the soil and in subterranean waters. There was detected in several residents of this area the presence of dieldrin and DDE in the organism and proved that the tax of mortality in Vila Carioca is bigger than in the area of Ipiranga.

The SMS has followed the development of the issue of the environmental contamination and the exposure of the residents of Vila Carioca taking aim at the preservation of the health of the affected population which involve:

- To recommend the monitoring of the population's health with the capacity of a compatible observation with specialists and it is very important to have the presence of a toxicologist.
- To discuss with the environmental agency about the need of the medication of the area having the possibility of moving the population to finish the exposure by the real contamination by the medication process.

The same attitudes have been taken in Paulínia in a place called Recanto dos Pássaros. The similarity is even bigger considering that the industrial activity that caused the contamination in that area was located in Vila Carioca and it was transferred to that place.

On August 26<sup>th</sup> 2005 these partial information of "The Work Plan" were presented to CVS/SETX and 4 people of the commission of toxicologists that prepared the Plan to evaluate the immediate decisions. They showed adhesion in the preparation of the award of the cases which had the presence of dieldrin in the serum.

According to the determination of the Prosecution Office of Justice of the Environment of the Capital copies of this report will be sent to the referred Office, to Shell and also to the residents by the representatives of the organizations.

Carlos Ferreira de Aguiar Junior:  
Clarice Umbelino de Freitas:  
Maria de Fátima Hangai Ushirobira:

São Paulo, September 05th, 2005.

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June 04<sup>th</sup>, 2003

Referring to: Environmental Contamination in Vila Carioca/Shell do Brasil S.A.

The coordination of the state system of Toxicology of São Paulo/ Center of Health Care presents the Work Plan for the beginning of the evaluation of the health of the residents in the Basis I and II of Shell do Brasil S.A in the village of Vila Carioca in São Paulo which was prepared from the analysis of the information of the documents on May 05<sup>th</sup>, 2003 carried out by the Coordination of SETOX/ CVS and SAMA/ CVS in meeting with the commission of consultation on May 7<sup>th</sup>, 14<sup>th</sup>, 28<sup>th</sup> and also on June 4<sup>th</sup>, 2003.

The recommendations according to the work of the Permanent Commission of Experts of Toxicology for Contaminated Areas were prepared by the available information about the environmental evaluation until the actual date considering a program of initial work.

## **WORK PLAN**

### GENERAL CONSIDERATIONS

- \* Some considerations are introduced for the comprehension of the propositions:
- \* There is not information about when started the dispersion of the contaminants in the environment and how it was making it more difficult to understand the possible routes of exposure and the time of exposure of the people to the toxic substances.
- \* The company Geoclock and CETESB showed some evaluations of the soil. In these analysis were detected agro toxic organoclorados of the ciclodienos group (known as Drins: Aldrin, Dieldrin and Eldrin) in the surface and it is not possible to establish the extension of

the contamination of the area. However these contaminants were found inside and outside the Company.

- \* There are not complete basis about the contamination of the waters by chemical products.
- \* There are not sufficient basis of the emission of solvents and gas in the air.
- \* As the historical basis of the accomplished activities in the place by Shell we know that the company worked with agro toxics (organoclorados and others) and also with products of petroleum. Actually the company goes on working with those kinds of products.
- \* In wells were identified Dieldrin and lead.
- \* Lead was found on samples of dregs from the base of one of fuel tanks.
- \* For the establishment of the criteria of the evaluation of the population who lives around was considered: susceptibility, time of exposure, age and the analytic information available referring to the environmental contamination.
- \* It became as a base the information of the population obtained in the investigation by DIR-1- and there is not sufficient information about the time of living in the determined place although lots of residents have been living there for all their lives.
- \* In the groups of population that will be analyzed include the residents who work or worked at Shell.
- \* In the groups of population that will be analyzed include the residents of Fuel/ The Municipal Chamber of São Paulo.
- \* The complaints of the residents were frequent analyzed by several surveys conducted by the involved institutions.

## **RECOMMENDATIONS**

General work proceedings:

1. To make a register of all the individuals who contemplate the following criteria:

The criteria to select the groups to be evaluated:

- a) Age groups more susceptible: children over 1 to 10 years old (approximately 262) and adults over 50 years old (approximately 420) that live, study and work in this area (areas 1 and 2);
- b) The well water consume: inclusion of all that consumed this well water of the Auriverde Condominium independently of the age (233 individuals).
- c) Workers and former workers of Shell who live in this area: 61 individuals according to the investigation.

- d) People who submitted to the exams in a laboratory: by solicitation of CPI of the Municipal Chamber of Fuel of São Paulo.

Of the Register:

- a) It is suggested a pattern of register for the epidemiologic data. (enclosed 1)
- b) It's necessary to have a pre test for the register and training of the executer.
- c) The register needs to be done by the social assistant of health in the region with a supervision of the central service or the coordinator of the works.

Observations:

- a) Considering the summing of the selected groups according to the document of SAMA/CVS and SETOX/CVS there are around 1000 individuals.
  - b) The individuals or residents who include in the criteria for the evaluation and for any reason have been related to the investigation of DIR-1 need to be joined.
  - c) There is not information about the number of individuals who go to the demarked place (areas 1 and 2) to study or to work.
  - d) The individuals included in the investigation of DIR-1 that do not live at the moment in this area will be contacted.
2. Anamneses and general physical examination according to the protocol (enclosed 2).
3. Laboratorial exams:
- a) Not specific: complete blood count, VHS, total and fractions proteins, cholesterol, and dosages of bilirrubinas (direct and indirect) Alanimo-aminotransferase (ALT), Aspartato-aminotransferase (AST) and Gama-glutamyltranspeptidase (GGT); dosages of ureia and creatinina; T3 and T4 and also TSH, urine I, parasitological of aces.
  - b) Specific: quantity of metals in the blood (lead, arsenic, mercury, manganese) and organoclorados elements.
  - c) Other exams: the evaluation of carcinogenicos and mutagenicos to the doctor's criteria.

Observation:

- a) All the integrants of the selected population will be required the same group of exams without the difference of other exams according to the doctor's criteria after the clinical result.
- b) The suggestion is to standardize the evaluation of the exams with standards earlier established.
- c) The necessity of choosing the clinical laboratories and toxicological which have an analytic skill for the required exams.
- d) Suggesting that will be required to the laboratories the protocols of samples.

4. Complementary exams: According to the medical observation it will be possible to have other complementary exams to confirm the diagnosis as: ultra-sound of the stomach, eletroneuromiografia of the superior and inferior parts, electroencefalogram, high digestion endoscope, tests of the lungs function, X-ray of the chest, exam neuron-behavior and dosages of imunoglobinas and others.
5. Monitoring: the proceedings and frequency will be determined after depending on the results of this initial program of health exams. The commission can suggest a plan of monitoring if instigated to do it.

## **ABOUT THE CONTAMINANTS**

The contaminants considered from the available information are the organoclorados agro toxics, metal, aliphatic and aromatic hidrocarbonetos. These toxics are considered to all the individual groups.

## **OTHER GENERAL RECOMMENDATIONS:**

1. It needs to have the air test and also suggests an immediate installation of the Air Monitoring Station in the area.
2. The group who leads should promote an analysis of the structure which is necessary for the development of the Work Plan and its arrangements considering the necessity to effectuate the register of information in a way to help its analysis considering the posterior monitoring.
3. Considering that was realized a Course of Clinical Toxicology for UBS in this place and will be the responsible for the work it suggests the prevision of recycling or to make a profound study of the specific aspects according to the needs.
4. It is suggested to have a survey about health in this area.

The commission understands that its mission is to be there and these propositions are the suggestions until now as those who are the managements and executives of the process need to proceed to the analysis and elaboration of the reports. It can be checked when necessary specially to offer its concept to the reports.

Darciléia Alves do Amaral  
CCI-PMSP

Igor Vassilief  
Municipal Health Office of Paulínia

Carmen Ildes R. Froes Amus  
Center of Health Science – UFRJ

Eliane Gandolfi  
Coordinator of the State System of Toxic Care – SETOX-SP/CVS

Eládio dos Santos Filho  
CCI – Santos

Maria Zilda Carrazza  
CCI-PMSP

