

## 資料編

1. 調査対象地域図及びフィージビリティ調査地域図面
2. 再委託調査の実施にかかる基本単価
3. 質問状及び収集資料リスト

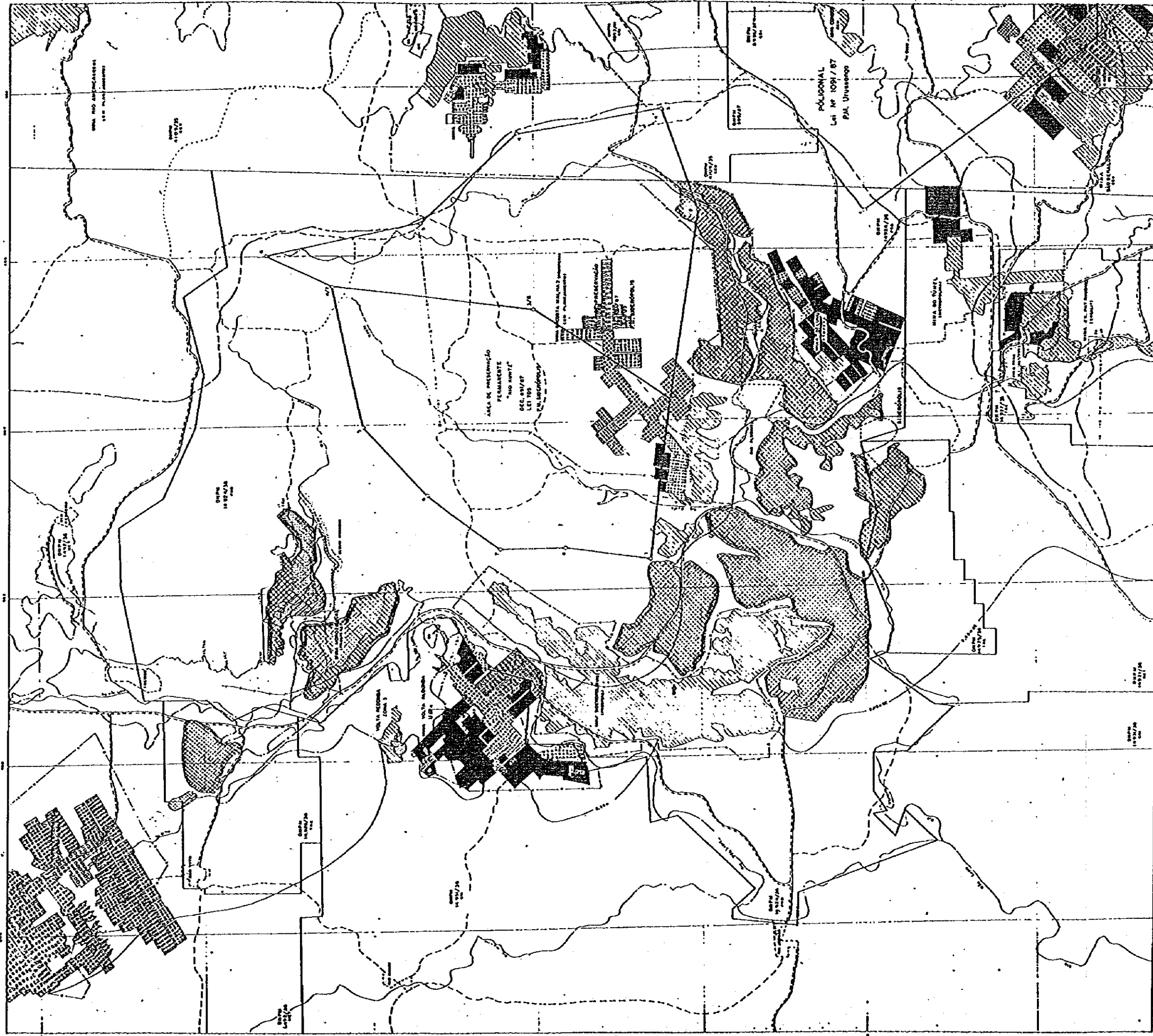


## 1. 調査対象地域図及びフイージビリテイ調査地域図面





CRICIUMA - BI

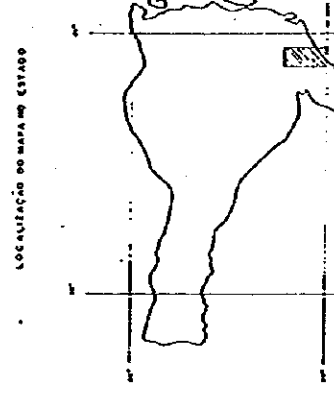


**LEGENDA**

[Symbol]	Alto tomado em 1967 (em tons)
[Symbol]	Alto tomado em 1984
[Symbol]	Alto tomado em 1994
[Symbol]	Alto tomado em 2004
[Symbol]	Alto tomado em 2014
[Symbol]	Alto tomado em 2024

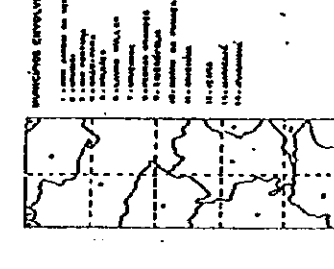
**LEGENDA**

[Symbol]	Parque urbano
[Symbol]	Parque rural
[Symbol]	Parque de recreação
[Symbol]	Parque de preservação ambiental
[Symbol]	Parque de preservação paisagística
[Symbol]	Parque de preservação histórica
[Symbol]	Parque de preservação cultural
[Symbol]	Parque de preservação religiosa
[Symbol]	Parque de preservação natural
[Symbol]	Parque de preservação arqueológica



**IDENTIFICAÇÃO DAS FOLHAS**

A	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	A27	A28	A29	A30	A31	A32	A33	A34	A35	A36	A37	A38	A39	A40	A41	A42	A43	A44	A45	A46	A47	A48	A49	A50
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**Fig-3. CRICIUMA-BI**

ESCALA 1:20.000

MME - DNPM  
EQUIPE TÉCNICA DO CARVÃO/ULTRAFINA  
1984

**LEVANTAMENTO DA SITUAÇÃO DAS MINAS E CONCESSÕES DA BACIA CARBONÍFERA DE SANTA CATARINA**

Projeto	Execução	Revisão	Aprovação
...	...	...	...



Fig-5 FOLHA GUATA

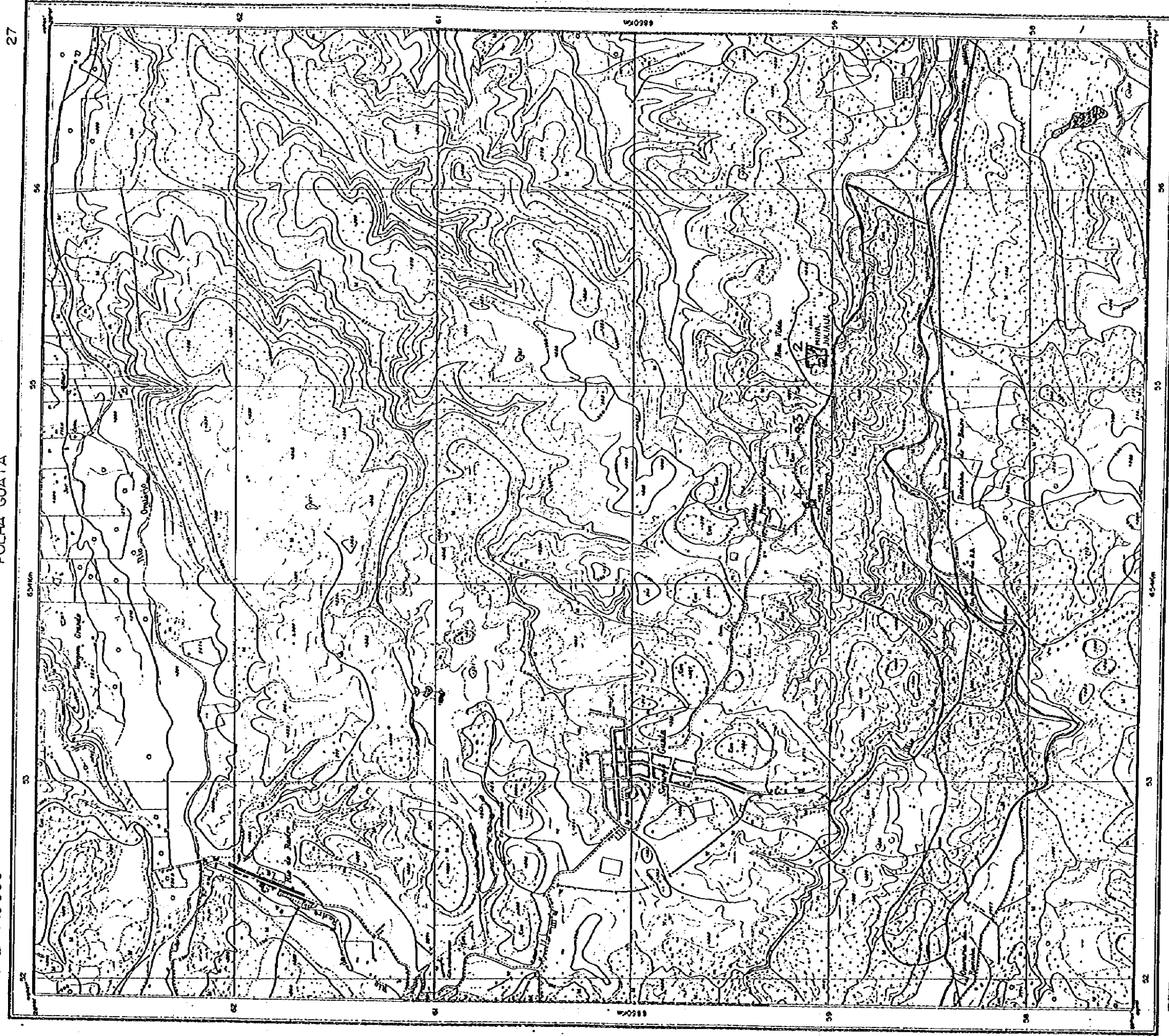
# COMISSÃO EXECUTIVA DO PLANO DO CARVÃO NACIONAL

PLANTA AEROFOTOGRAMÉTRICA DA ZONA CARBONÍFERA DO SUL DO ESTADO DE SANTA CATARINA

1956

ESCALA 1:10000

FÓLHA GUATÁ



SE  
GE  
LDA



Fig-6 FOLHA SANTANA

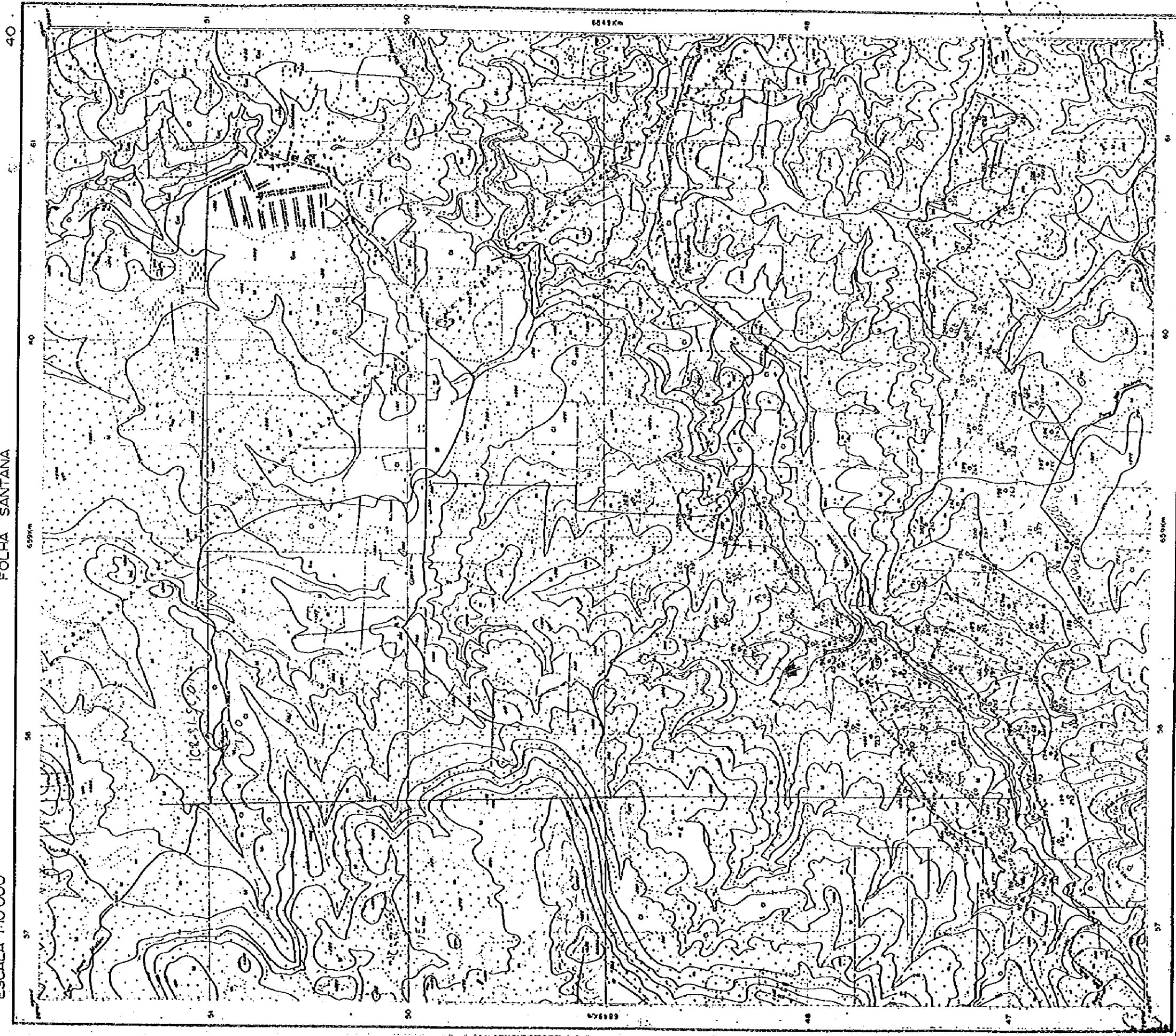
COMISSÃO EXECUTIVA DO PLANO DO CARVÃO NACIONAL

PLANTA AEROFOTOGRAMÉTRICA DA ZONA CARBONÍFERA DO SUL DO ESTADO DE SANTA CATARINA

1:100.000  
1956

FÔLHA SANTANA

ESCALA 1:10.000



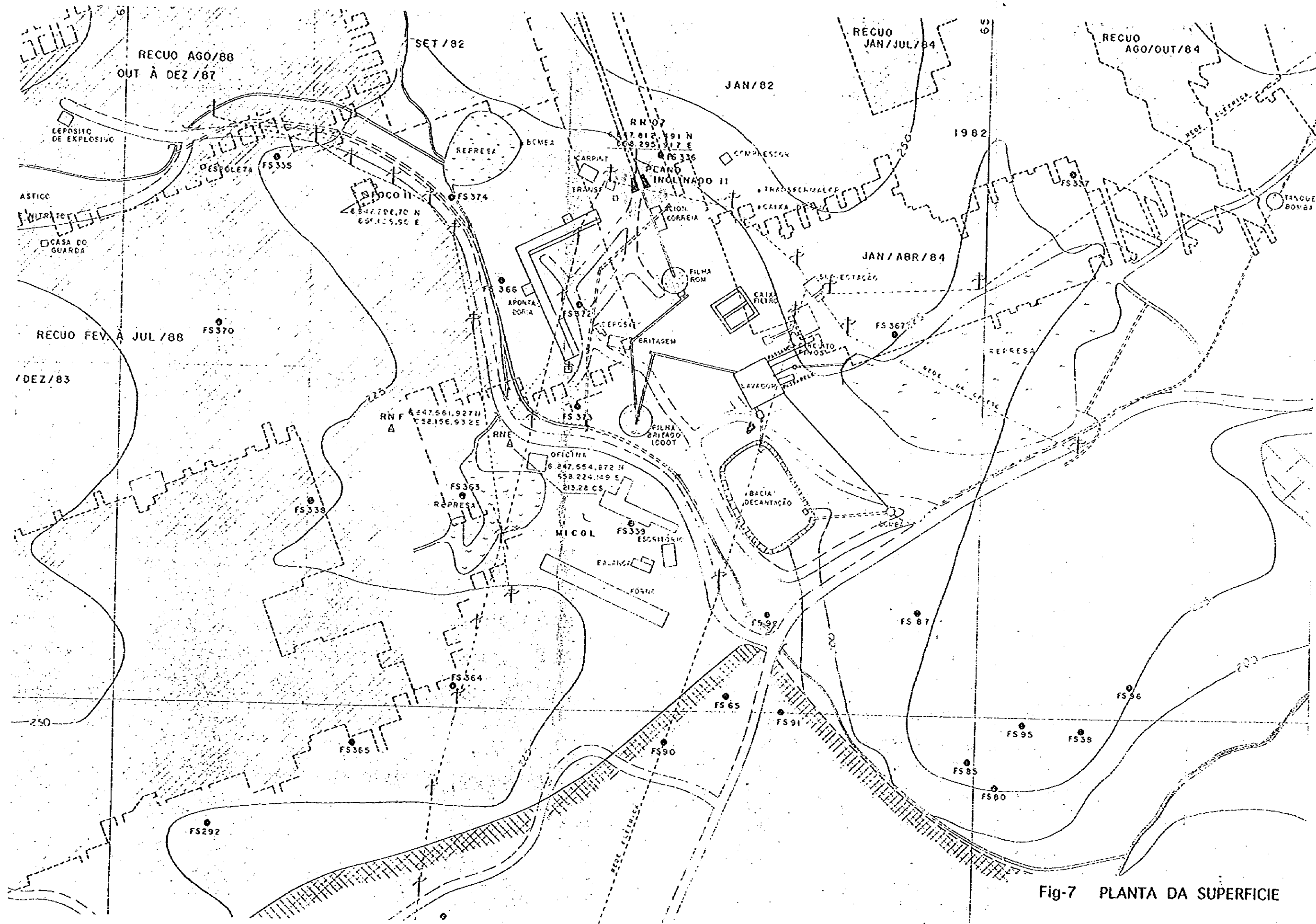


Fig-7 PLANTA DA SUPERFICIE

Fig-8 FOLHA SIDEROPOLIS

# COMISSÃO EXECUTIVA DO PLANO DO CARVÃO NACIONAL

PLANTA AEROFOTOGRAMÉTRICA DA ZONA CARBONÍFERA DO SUL DO ESTADO DE SANTA CATARINA

1956

ESCALA 1:100000

FOLHA SIDEROPOLIS

53



Fig-9 FOLHA PRIMEIRA LINHA

# COMISSÃO EXECUTIVA DO PLANO DO CARVÃO NACIONAL

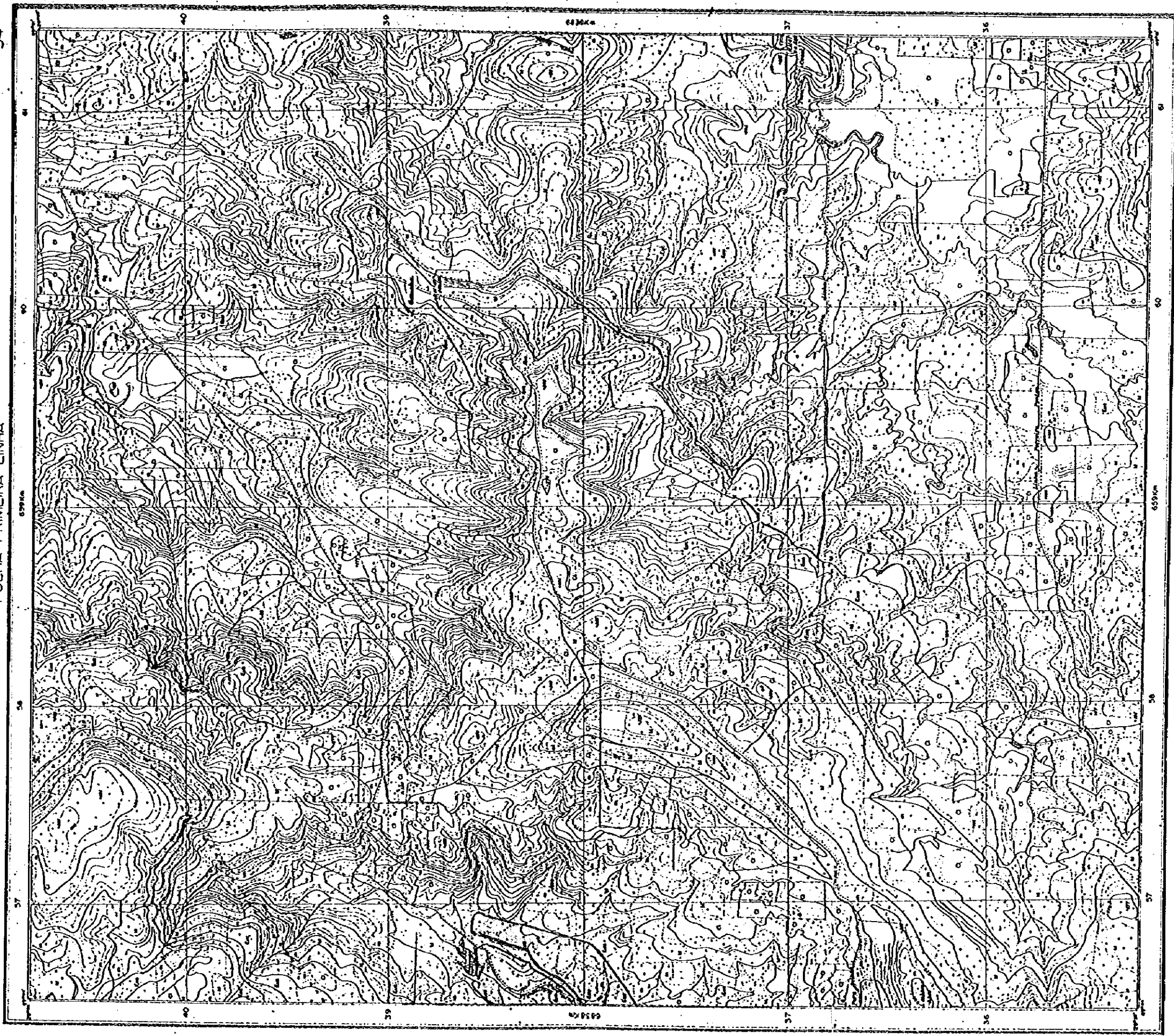
PLANTA AEROFOTOGRAMÉTRICA DA ZONA CARBONÍFERA DO SUL DO ESTADO DE SANTA CATARINA

1956

ESCALA 1:100 000

FÔLHA PRIMEIRA LINHA

54





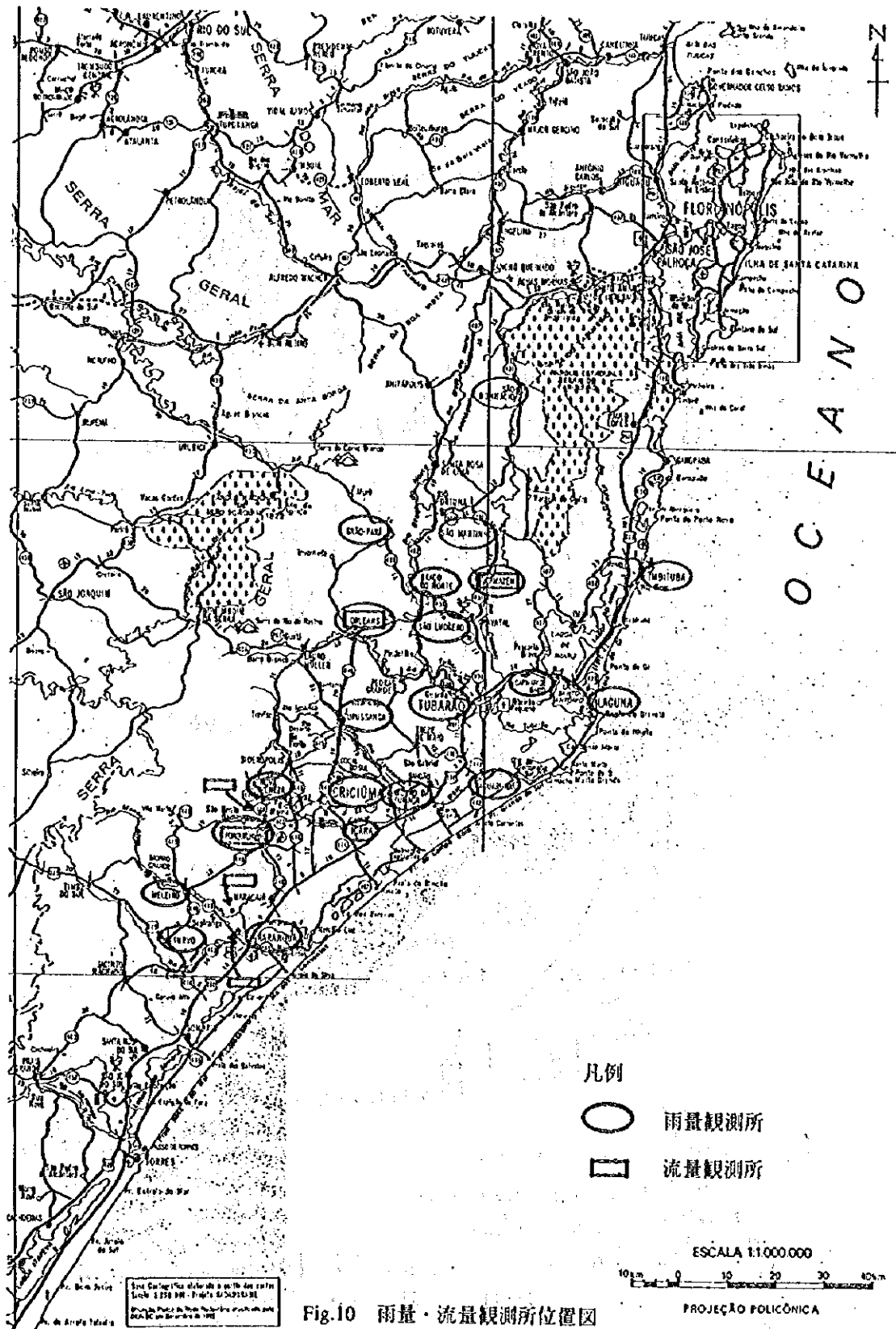
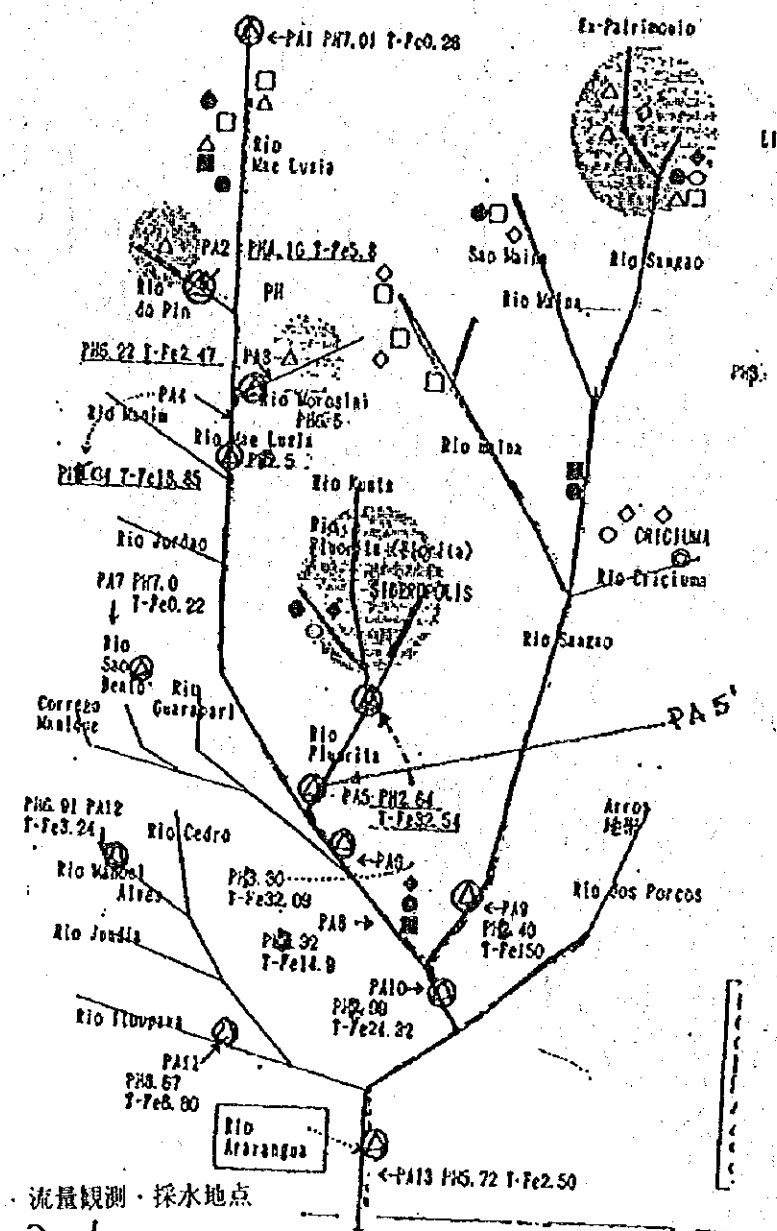
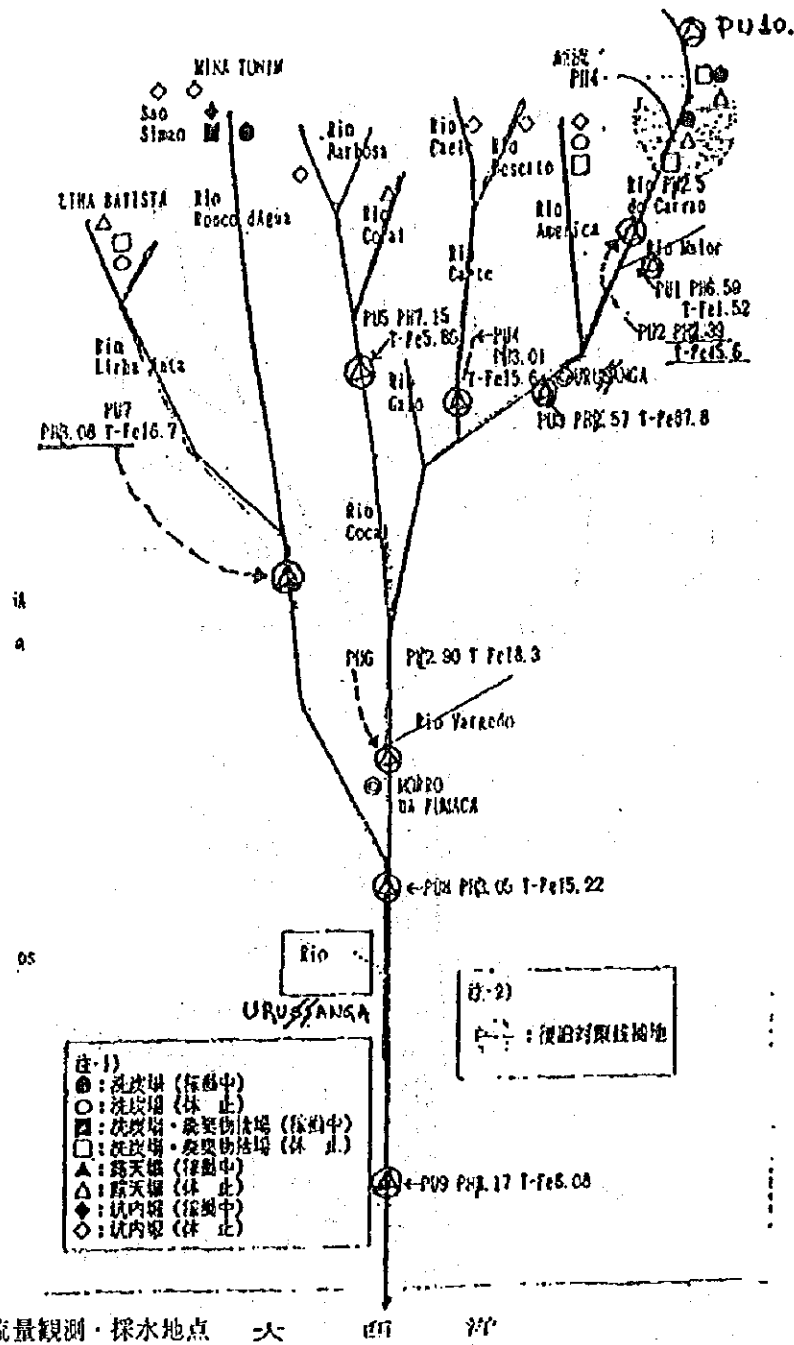


Fig.10 雨量・流量観測所位置図



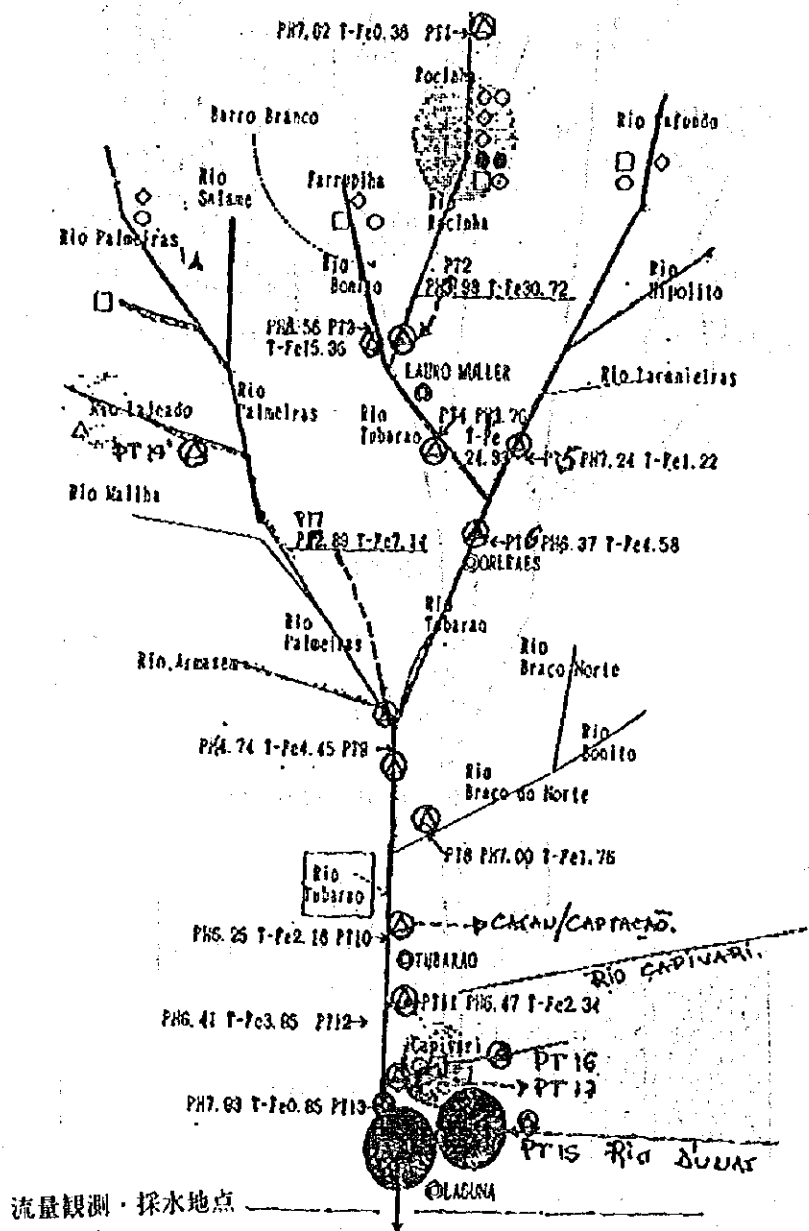
流量観測・採水地点  
 (△) - PONTOS DE COLETA  
 MOVIMENTO VAZÃO E  
 QUALIDADE FÍSICO-QUÍMICA.

OBS.: Ponto PA 5' - faz do Rio Fiorita - SEM INCLUIR  
 Fig.11-1 流量観測・採水地点位置図



流量観測・採水地点  
 ④ ~ PONTOS DE COLETA  
 MONITORAMENTO/USUÁRIO E ANÁLISE FÍSICO, QUÍMICA  
 Fig.11-2 流量観測・採水地点位置図  
 AMZEL/UNARÁ. - TEMA



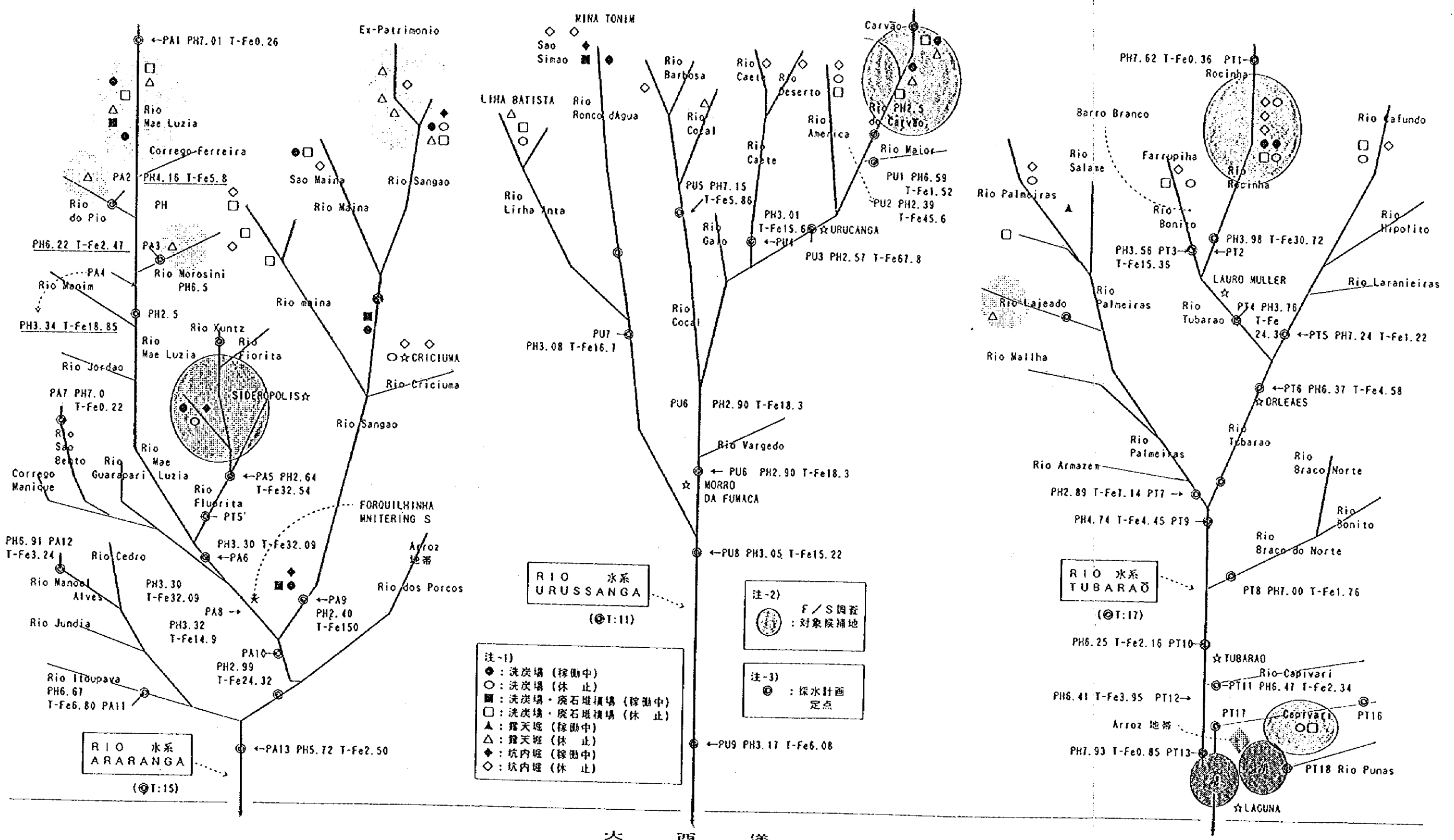


④ - Pontos de coleta:  
 monitoramento/usuário e análise físico-química.

Fig.11-3 流量観測・採水地点位置図

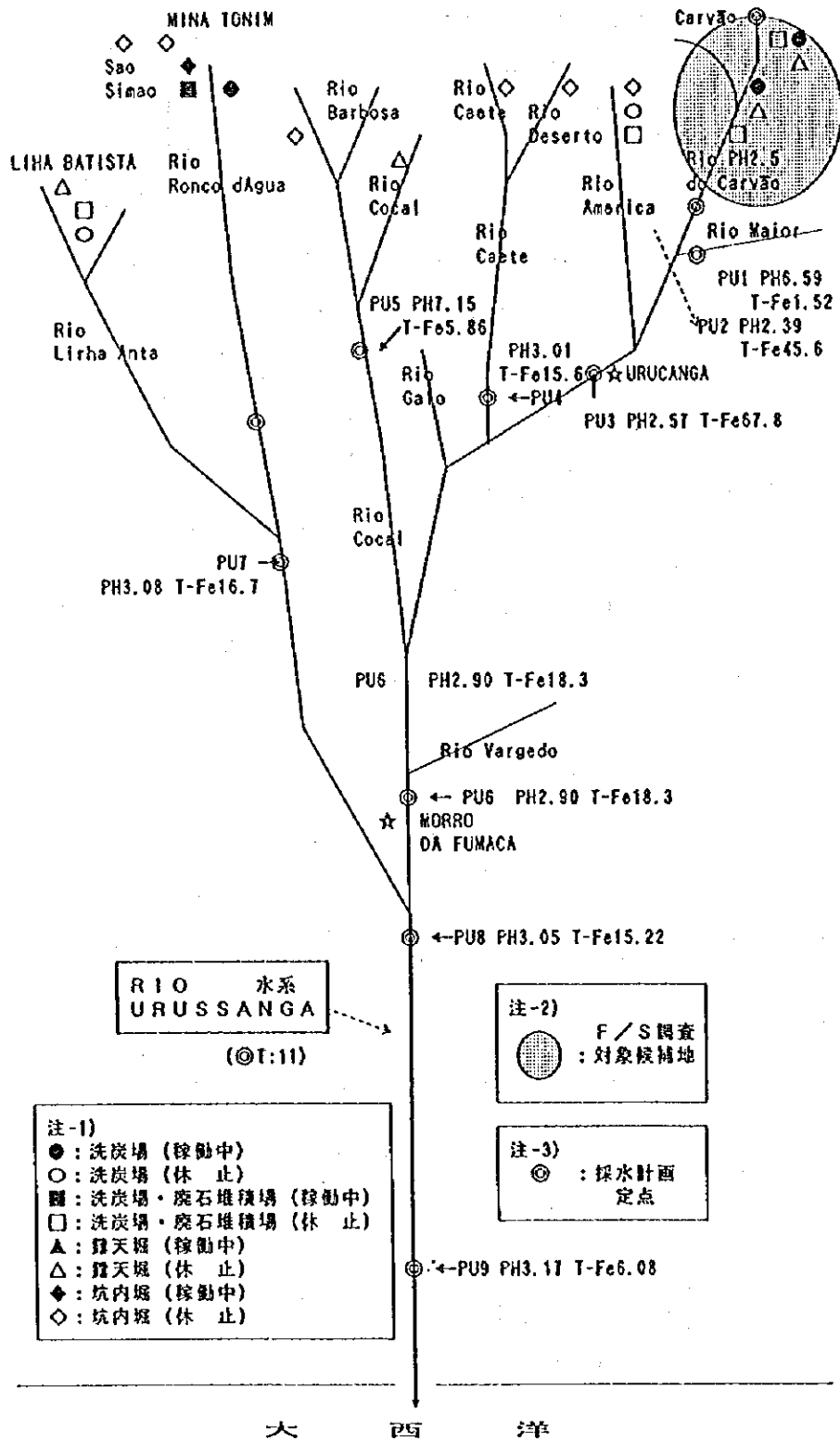


水系模式图：(图-12)









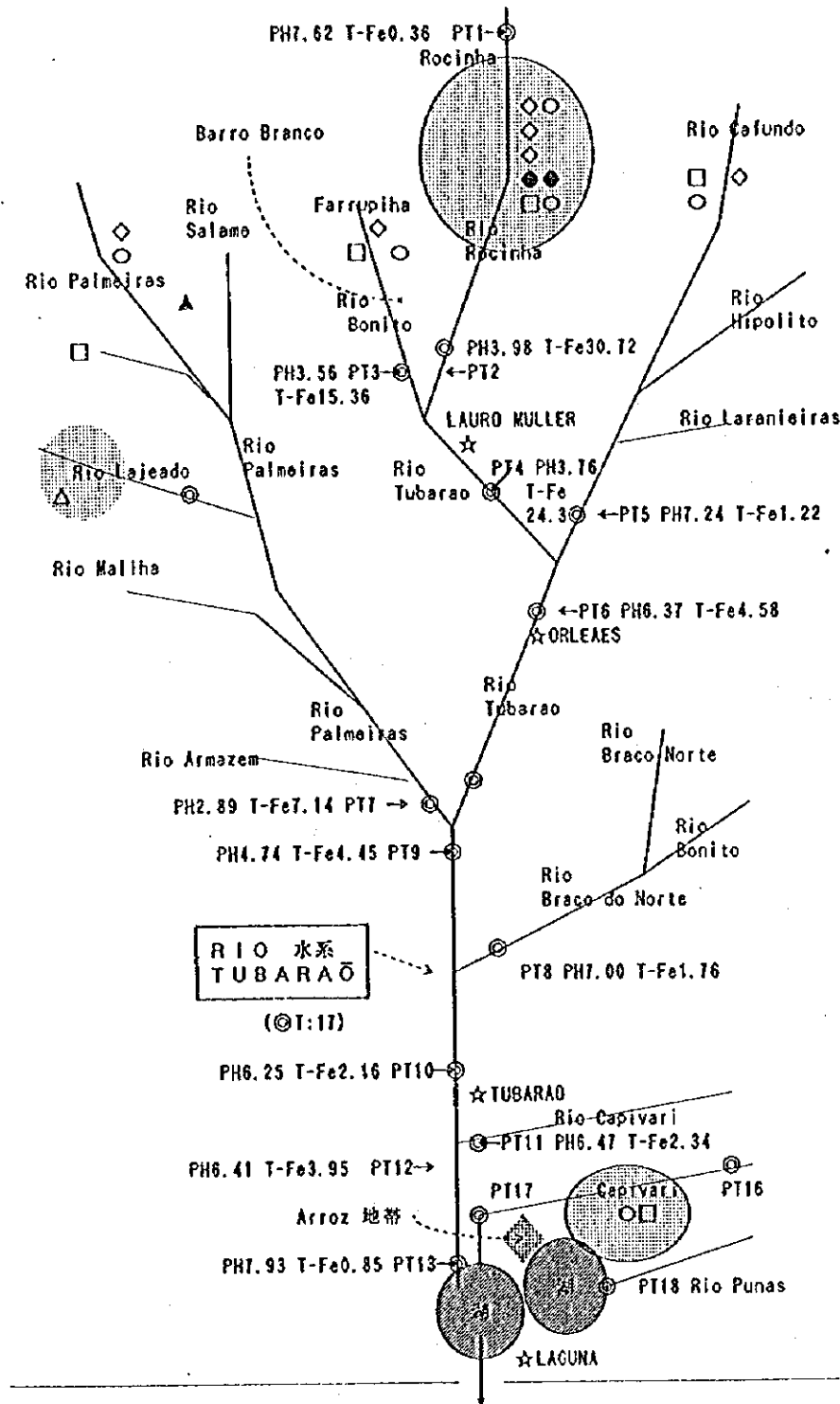
- 注-1)
- : 洗炭場 (稼働中)
  - : 洗炭場 (休 止)
  - : 洗炭場・廃石堆積場 (稼働中)
  - : 洗炭場・廃石堆積場 (休 止)
  - ▲ : 露天掘 (稼働中)
  - △ : 露天掘 (休 止)
  - ◆ : 坑内掘 (稼働中)
  - ◇ : 坑内掘 (休 止)

注-2)

● F/S調査  
: 対象候補地

注-3)

◎ : 採水計画  
: 定点



## 2. 再委託調査の実施にかかる基本単価

### (1) 水文調査

#### a) 自記水位計設置

水位計及びゾンデユニットの設置作業は再委託とし、観測所の構造については、水文担当団員が作成、指示する。DNPM のクリシウマ支局より入手した資材単価は次のとおりである。

・セメント	R \$ 6.2 / 袋 (一袋 50 kg)
・骨材	R \$ 21.1 / m <sup>3</sup>
・砂	R \$ 12.5 / m <sup>3</sup>
・型枠 (Pinus)	R \$ 150 / m <sup>3</sup>
・塩ビ管 (径 25 cm)	R \$ 61 / m
・労務費 - ブロック工	R \$ 40 / 日
- 一般作業員	R \$ 20 / 日
・コンクリートミキサー	R \$ 30 / 日
・レディミクストコンクリート	R \$ 98 / m <sup>3</sup> (ラウロ・ミュラー市渡し)

(註・上記単価は運搬費含まず)

#### b) 地下水調査用ボーリング

ボーリングの単価は DNPM のクリシウマ支局より入手したが、これによると 40 - 50 R \$ / m でコアのサンプリングを含んだ値である。

### (2) 水質測定・モニタリング

次のページ参照。

### (3) 測量

以下に添付する資料参照。

### (4) 復旧対策

現地で入手した復旧対策に係わる試験の費用を次に示す。

- ・ Neutraization Test 100 samples R\$ 850
- ・ Float & Sink Test 10 samples R\$ 1,100
- ・ Chemical Analysies 400 samples R\$ 4,370

### (5) 環境調査

現地で入手した環境調査に係わるコンサルタント及び費用を次に示す。

Subcontract

- ・ Enviromental Study

1) ENGEVIX (048-224-5022 Florianopolis) ENG. ANTUNES

2) MAGNA ENGENHARIA (051-343-1144 Porto Alegre) ENG. ASEJALMO

350,000 U \$ (10,000hr, 4,000ha)



再委託調査のうち、水質モニタリング分析費は予算的制約もあり次の3案を提案したい。

注) a : 地点数、b : 回/月、c : 回/日、d : 成分数、e : 期間(月)、f : 成分/件/年、@ : 平均分析単価(R\$) g : 回/年、c<sub>1</sub> : 7回(操業時間内)

	-対象名-	: a · b · c · d · e = f × @ = 分析費 R\$ (千円)	: a · g · c <sub>1</sub> · d
第 I 案	・ F/S対象4地点	: 08·03·04·10·12 = 11,520 × 10.92 = 125,798.20	
	・ 3河川水系	: 35·03·04·08·12 = 40,320 × 10.92 = 440,294.40	
	・ " "	: 35·01·04·07·12 = 11,760 × 10.92 = 128,419.20	
	・ 稼働鉱山/選炭場	: 20·04·07·10 = 5,600 × 10.92 = 61,152.00	
	・ ハクザン水調査	: 03·02 ·75 = 450 × 10.92 = 4,914.00	
	・ 底質調査	: 35·02 ·11 = 770 × 13.60 = 10,472.00	
	合 計 (調査要素: 日内、月間変動)		= 70,420 × 10.95 = 771,049.80(77,105)
第 II 案	・ F/S対象4地点	: 08·03·02·10·12 = 5,760 × 10.92 = 62,899.20	
	・ 3河川水系	: 35·03·02·08·12 = 20,160 × 10.92 = 220,147.20	
	・ " "	: 35·01·02·07·12 = 5,880 × 10.92 = 64,209.60	
	・ 稼働鉱山/選炭場	: 20·04·07·10 = 5,600 × 10.92 = 61,152.00	
	・ ハクザン水調査	: 03·02 ·25 = 150 × 10.92 = 1,638.00	
	・ 底質調査	: 35·02 ·11 = 770 × 13.60 = 10,472.00	
	合 計 (調査要素: 月間変動)		= 38,320 × 10.97 = 420,518.00(42,052)
第 III 案	・ F/S対象4地点	: 08·03·01·10·12 = 2,880 × 10.92 = 31,499.60	
	・ 3河川水系	: 35·03·01·08·12 = 10,080 × 10.92 = 110,073.60	
	・ " "	: 35·01·01·07·12 = 2,940 × 10.92 = 32,104.80	
	・ 稼働鉱山/選炭場	: 20·04·07·10 = 5,600 × 10.92 = 61,152.00	
	・ ハクザン水調査	: 03·02 ·25 = 150 × 10.92 = 1,638.00	
	・ 底質調査	: 35·02 ·11 = 770 × 13.60 = 10,472.00	
	合 計 (調査要素: 月間変動)		= 22,420 × 11.01 = 246,890.00(24,689)

ブラジル石炭鉱復旧計画調査／事前調査

調査項目	調査内容	FATMA	調査誌	仕様	概算予算(万円)	購入機器	仕様	概算予算(万円)	適用
(1)水文調査					計1210			計1640	
- 調査	調査、指導、解析	調査作業、管理	-			雨量計2台	デジタル記録型	145	ノートパソコン/台含む
- 採集	資料収集、解析	収集補助	-					332	
- 水位	調査、指導、解析	調査、管理	調査作業	自動水位計設置	120	自動水位計2台	超音波型	60	
- 流量観測(府水支川及び河川)	測定、指導、解析	調査、測定補助	-			流速計2台	広井式	40	
- 堆砂	調査、指導、解析	調査、測定補助	分析	程度等	(2)に含む	小型流速計2台	4-5人乗り	15	
- 地下水	調査、指導、解析	採取、測定補助	*-リング/L=2.0m	2孔/ヶ所=8孔		同級、汲水機等		33	
(2)水質測定・モニタリング					計4,200			計1,670	
- 自動観測	測定、指導、解析	調査、測定補助、管理	調査作業	水位計設置に含む		インテリジェント		723	IBM PC/7237/台
- 移動式(定点)観測	測定、指導、解析	調査、測定補助	-			採水器2台	*-777	258	
- 水質モニタリング分析	調査、指導、解析	採取、測定補助	分析			移動式採水器	*-777	658	校正用標準含む
- 腐食性分析	調査、指導、解析	採取、測定補助	分析			777/台	デジタル転送	12	解析用ソフト含む
- その他分析	調査、指導、解析	採取、測定補助	分析	地下水、堆砂等	4,200	採水器等	カートリッジ型	19	
(3)調査					計2000				
- 調査地域(ヶ所)	調査、指導	調査	一括調査化	縮尺1:10,000					
- FFS調査地域(ヶ所)	調査、指導	調査	- 地形調査	縮尺1:1,000					
- 露天産、沈殿地跡地	調査、指導	調査	- 環境調査						
- 河川調査	調査、指導	調査	- 概観調査						
- *-リング、流観地点	調査、指導	調査	- 水質、GPS						
(4)復旧対策					計370				
- 中和剤投与	調査、指導、解析	調査、測定補助	分析	化学系、生物系	55				
- 泥炭炭化物7/1	測定、指導、解析	調査、測定補助	分析	粒度、比重、可燃物	15				
- 土質試験	採取、指導	調査、測定補助	試験	粒度、比重、透水性	50				
- *-リング	調査、指導	調査	*-リング/L=800m	80ヶ所/L=10m/L=800m	250				
(5)環境改善調査					計1,850				
- 生態調査	調査、指導、解析	調査、指導	調査	2,000ha(5,000時間)	1,800				
- 生態系調査	指導	調査	-						
- 環境改善物調査	採取、分析	調査	分析補助		60				
合計					8,640			2,310	総計10,950万円



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## LIST OF LAB TESTS

Chemical Parameters	Method of Analysis	Unit Cost (R \$)
Total Acidity	Titulometric to determined pH	5,50
Alkalization of Carbonates and Bicarbonates	Titulometric to determined pH	5,50
Phenolphthalein Alkalization	Titulometric to determined pH	5,50
Hydroxide Alkalization	Titulométrico to determined pH	5,50
Total Alkalization	Titulometric to determined pH	5,50
Residual Aluminium	Photometric Erlochrome	11,28
Ammonia		10,60
Boron	Photometric with carminic acid	12,80
Cadmium	Photometric with ditizone	10,50
Calcium	Complexometric with EDTA	5,50
Total Organic Carbon	Infra-Red Combustion	15,80
Lead	Photometric with ditizone	7,07
Cyanide	Selectivelon Measurer	13,70
Chloride (clear water)	Argentometric	6,80
Chloride (dark water)	Argentometric	7,02
Copper	Photom, with diethyldithiocarbonate of soda	9,30
Color	Comparative (disk)	1,90
Chrome	Photometric with difenilcarbozide	10,80
Total Chrome	Photometric with difenilcarbozide	12,00
DBO 5 (water)	OD Detection by Winkler	13,50
OBO 5 (effluent)	OD Detection by Winkler	14,50
Detergents (ABS/LAS)	Photometric with Methyl	5,92
DQO	Reflux with dicromate	7,37
Hardness/ Calcium	Complexometric with EDTA	4,60
Hardness/ Magnesium	Complexometric with EDTA	7,98
Total Hardness	Complexometric with EDTA	4,60
Phenols	Photometric Aminoantipirina	13,70
Total Iron	Photometric ortophenantroline	6,28
Fluorides	Selective Ion Measurer	13,80
Phosphate e Total Phosphorus	Photometric sulphonic amino naphthol...	10,50
Carbon Dioxide	Titulométrico a pH determinado	5,50
Magnesium	Complex with EDTA	7,98
Manganese	Photometric with ammonia persulphate	9,60
Mercury	Photometric with ditizone	9,60
Nickel	Photometric with dimetilgloxime	9,60
Ammoniacal Nitrogen	Nesslerization	16,50
Organic Nitrogen	Titulometric with sulphuric acid	16,50
Total Nitrogen	Titulometric with sulphuric acid	22,30
Oils and Grease	Extraction with solvents	15,80
Consumed Oxygen	Potassium Permanganate	5,84
Dissolved Oxygen	Modified Winkler	5,84
pH	Potentlometric	0,81
Silver	Photometric with ditizone	9,80
Salinity	Argentometric	7,02
Sulphates	Turbidmetric	12,36
Sulphides	Selective Ion Measurer	13,70
Zinc	Photometric with zinc	12,00
Zirconium	Photometric with selenious acid	12,00



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## LIST OF LAB TESTS

**Chemical Parameters                      Method of Analysis                      Unit Cost (R \$)**

Total of Excremental Matter (Baineability)..Multiple Tubes (2 series of 3 tubes) ... 25,20  
 Total of Excremental Matter (Drinkability) Multiple Tubes (3 series of 5 tubes) ... 32,60

**Chemical Parameters                      Method of Analysis                      Unit Cost(R \$)**

pH .....	Potentiometric .....	0,81
Conductivity .....	Potentiometric .....	2,90
Dissolved Solids (103-105 °C) .....	Gravimetric .....	6,35
Volatile Dissolved Solids (600 °C) .....	Gravimétrico .....	9,50
Sedimentary Solids .....	Imhoff Cones.....	3,33
Suspended Solids (103-105 °C) .....	Gravimetric .....	5,27
Fixed Suspended Solids (600 °C) .....	Gravimetric .....	9,50
Total Solids (103-105 °C) .....	Gravimetric .....	3,73
Fixed Total Solids (600 °C) .....	Gravimetric .....	4,89
Volatile Total Solids (600 °C) .....	Gravimetric .....	7,37
Temperature (Air and Water) .....	Thermometer (Quicksilver) .....	1,20

Solid Waste Classification, with characterization  
 characterization of 5 elements on lists n. 7 and 8 of NBR 10004..... 93,60

Quantitative Analysis of Copper, Iron, and Manganese Solids ..... 16,50  
 Quantitative Analysis of Copper Solids ..... 11,30  
 Quantitative Analysis of Iron Solids ..... 9,20  
 Quantitative Analysis of Manganese Solids... 10,50

Jar Test ..... 8,60

Sink-Float Test ..... Inorganic ..... 25,00  
 Sink-Float Test ..... Organic ..... 110,00



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## LIST OF LAB TESTS

### Spectrophotometry of Atomic Absorption

#### Water Analysis

Chemical Parameters	Unit Cost (R \$)
Boron .....	16,64
Cadmium .....	13,65
Calcium .....	7,15
Lead .....	9,19
Copper .....	12,09
Chrome .....	14,04
Total Chrome .....	15,60
Total Iron .....	9,80
Total Phosphorus .....	13,65
Magnesium .....	10,37
Manganese .....	12,48
Mercury .....	12,48
Nickel .....	12,48
Zinc .....	16,60

#### Sediment Analysis

Chemical Parameters	Unit Cost (R \$)
Boron .....	19,97
Cadmium .....	16,38
Calcium .....	5,58
Lead .....	11,00
Copper .....	14,51
Chrome .....	16,85
Total Chrome .....	18,72
Total Iron .....	9,80
Total Phosphorus .....	16,38
Magnesium .....	12,44
Manganese .....	14,98
Mercury .....	14,98
Nickel .....	14,98
Zinc .....	18,72



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 Núcleo de Pesquisas Ambientais - NUPEA  
 Laboratório de Análises Físico-químicas e Bacteriológicas

## SOILS LAB

### LIST OF LAB TESTS

Chemical Parameters	Method of Analysis	Unit Cost (R \$)
pH (CaCl <sub>2</sub> ) .....	Potentiometric .....	2,20
pH (Water) .....	Potentiometric .....	2,20
Granulometry (4 sieves) .....	Vibrating Sieves .....	7,30
Granulometry (7 sieves) .....	Vibrating Sieves .....	8,90
Moisture .....	Gravimetric .....	4,20
Total Nitrogen .....	Raney Alloy .....	8,50
Soluble Potassium .....	Photometric .....	8,50
Total Phosphorus .....	Gravimetric with Sodium Molibdate .....	8,50
Total Calcium .....	Quelatometric with EDTA .....	8,50
Total Sulphur .....	Gravimetric with Barium Chloride .....	8,50
Total Magnesium .....	Quelatometric with EDTA .....	4,90
Neutralization Power .....	Titulometric with phenolphthalein .....	6,20
Chloro .....	Mohr Method .....	4,90
Total Organic Matter .....	Gravimetric .....	8,50
Organic Carbon .....	Relation/ Materials with Organic Matter .....	8,50
A.B.O. ....		12,80
FeS .....		8,50
Cyanides .....		16,44
Loss by Fire .....		9,50
Texture .....		12,50

### Collection of Samples

Unit Cost (R \$)

#### Criciúma County

Worked Hour

Technician (University Level) ..... R\$ 15,00

Technician (Secondary Level) ..... R\$ 6,00

Trainee ..... R\$ 2,50

#### Other Counties

Fuel ..... 0,30/km traveled

Worked Hour

Technician (University Level) ..... R\$ 15,00

Technician (Secondary Level) ..... R\$ 6,00

Trainee ..... R\$ 2,50



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### Teste de Neutralização - Jar Test

Reagentes	CaCo3 ou CaO
Análise de Água	pH
Número de Amostras	20
Preço Unitário	R\$ 8,50
Total	R\$ 170,00

### Granulometria do Rejeito

Número de Amostras	05	Total (R\$)
Peneiras: 50; 10; 0,5 mm	R\$ 7,30	36,50
Teste de Afundá-flutua	R\$ 25,00 (Inorgânico) R\$ 110,00 (Orgânico)	125,00 550,00



**BASE**

AEROFOTOGRAFIA E PROJETOS S. A.

RUA ROMÃO PUJOGARI, 157  
V. DAS MERCES - CEP 04184  
SÃO PAULO - SÃO PAULO  
FONE: (011) 848-4859  
FAX (011) 947-8583  
TELEX 11 54821 BAFO BR

**FAX MESSAGE**

**TO:** Mr. ZEN ITI YAMAKAWA (J.N.A.)  
**FAX:** 00813 3267 2137  
**FROM:** M. ASSANO (BASE S/A)  
**DATE:** Nov. 16, 1995.  
**RE:** SANTA CATARINA PROJECT

According to your request please find herewith our estimation cost for survey works in Santa Catarina State as follows:

**1. PROJECT AREA:**

The photogrammetric survey works will be carried out in four (4) areas belonging to the following river basins (partially).

- 1.1 Carvões River - Urussanga
- 1.2 Florita River - Sidelópolis
- 1.3 Rocinha River - Lauro Müller
- 1.4 Capivari River - Tubarão

**2. SCOPE OF WORKS:**

The scope of works will be consisted by the following activities and steps.

**2.1 PHOTOGRAMMETRIC MAPPING IN TWO (2) SCALES AS FOLLOWS:**

1:10,000 scale: 4 areas X  $\pm 10 \text{ Km}^2 = \pm 40 \text{ Km}^2$   
1:1,000 scale: 4 areas X  $\pm 0,5 \text{ Km}^2 = \pm 2 \text{ Km}^2$





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**2.2 ADDITIONAL FIELD SURVEY WORKS TO CHECK THE EXISTING LAKE'S DEPTH:**

± 2 sections X 4 areas = 8 sections

**2.3 GPS SURVEY TO ESTABLISH X,Y,Z COORDINATES FOR GEOTECHNICAL INVESTIGATION SITES:**

2 X 4 sites = 8 points

**2.4 RIVER CROSS SECTIONAL SURVEY, INCLUDING LEVELING WORKS**

± 48 sections

**3. PRICE**

The total amount to carry out all the job will be US Dollar One hundred ninety two thousand and four hundred only (US\$ 192,400.00).

**4. BREAK DOWN OF COSTS:**

The above total price is composed as follows:

**4.1 PHOTOGAMMETRIC MAPPING WORKS FOR FOUR (4) AREAS:**

a) Aerial Photography at 1:30,000 and 1:5,000 scale for each area:  
US\$ 9,000.00

b) Ground control survey for mapping at 1:10,000 and 1:1,000 scale for each area:

1:10,000 scale (± 10 Km<sup>2</sup>) = US\$ 11,000.00

1:1,000 scale (± 0,5 Km<sup>2</sup>) = US\$ 7,000.00

c) Stereo restitution works for each area

1:10,000 scale (± 10 Km<sup>2</sup>) = US\$ 6,000.00

1:1,000 scale (± 0,5 Km<sup>2</sup>) = US\$ 16,500.00

TOTAL a) + b) + c) = US\$ 39,500.00

TOTAL OF ITEM 4.1 = 4 area X US\$ 39,500.00 = US\$ 158,000.00



**BASE**

**AEROFOTOGRAMETRIA E PROJETOS S**

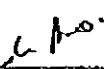
**4.2 ADDITIONAL SURVEY WORKS:**

- a) Existing lake's depth investigation  
± 8 sections X US\$ 300.00 = US\$ 2,400.00
  
- b) GPS survey for geotechnical investigation sites  
8 X US\$ 1,000.00 = US\$ 8,000.00
  
- c) River cross sectional survey including leveling works  
± 48 X US\$ 500.00 = US\$ 24,000.00

**TOTAL OF ITEM 4.2: US\$ 34,400.00**

At your entire disposal for any further information you may need, we remain.

Best Regards,

  
**Base Aerofotogrametria e Projetos S/A**  
**Massayoshi Assano**

gl-073



**BASE**

AEROFOTOGRAMETRIA E PROJETOS S/A

RUA ROMÃO PUIGGARI, 787  
V. DAS MERCÊS - CEP 04184  
SÃO PAULO - SÃO PAULO  
FONE: (011) 846-9191  
FAX: (011) 846-4058

**FAX MESSAGE**

**TO:** Mr. Seiichi YAMAKAWA  
**FAX:** 00813 3267 2137  
**FROM:** M. ASSANO (BASE S/A)  
**DATE:** Nov. 30<sup>th</sup>, 1995  
**RE:** SANTA CATARINA PROJECT (PRICE REVIEW)

With regard to our estimation cost dated Nov. 16, 1995, we have noted a mistake in the price for 1:1,000 stereo restitution works (item 4.1 c).

So we kindly ask you to consider the following modifications:

**ITEM 3 - PRICE:**

The total amount to carry out all the job will be US Dollar one hundred ninety nine thousand and four hundred only (US\$ 199,400.00).

**ITEM 4 - BREAK DOWN OF COST:**

The above total price is composed as follows:

**4.1 PHOTOGAMMETRIC MAPPING WORKS FOR FOUR (4) AREAS:**

- a) Aerial Photography at 1:30,000 and 1:5,000 scale for each area:  
US\$ 9,000.00
- b) Ground control survey for mapping at 1:10,000 and 1:1,000 scale for each area:  
  
1:10,000 scale ( $\pm 10$  Km<sup>2</sup>) = US\$ 11,000.00  
1:1,000 scale ( $\pm 0,5$  Km<sup>2</sup>) = US\$ 7,000.00
- c) Stereo restitution works for each area:  
  
1:10,000 scale ( $\pm 10$  Km<sup>2</sup>) = US\$ 6,000.00  
1:1,000 scale ( $\pm 0,5$  Km<sup>2</sup>) = US\$ 8,250.00

**TOTAL: a) + b) + c) = US\$ 41,250.00**

**TOTAL OF ITEM 4.1 = 4 areas X US\$ 41,250.00 = US\$ 165,000.00**



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**4.2 ADDITIONAL SURVEY WORKS:**

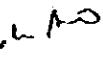
- a) Existing lake's depth investigation  
± 8 sections X US\$ 300.00 = US\$ 2,400.00
- b) GPS survey for geotechnical investigation sites  
8 X US\$ 1,000.00 = US\$ 8,000.00
- c) River cross sectional survey including leveling works  
± 48 X US\$ 500.00 = US\$ 24,000.00

**TOTAL OF ITEM 4.2 = US\$ 34,400.00**

All the other items remains without any modifications.

At your entire disposal for any further information you may need, we remain.

Best Regards,

  
**BASE AEROFOTOGRAFIA E PROJETOS S/A**  
**MASSAYOSHI ASSANO**

of-712



**BASE**

**AEROPHOTOGRAFIA E PROJETOS S/A**

RUA: RUA DO PURGARI, 181  
V. DAS MERCES - CEP 04181  
SÃO PAULO - SÃO PAULO  
PHONE: (011) 940-0100  
FAX: (011) 940-4000

**FAX MESSAGE**

To:

FAX:

ATTN:

FROM: M. ASSANO (BASE S/A)

DATE: Dec. 1<sup>st</sup>, 1996

RE: SANTA CATARINA PROJECT

According to your request, we are pleased to submit our cost estimation for survey work in Santa Catarina State, as follows:

**1. PROJECT AREA:**

The photogrammetric works will be carried out at 1:10,000 scale and 1:1,000 scale, and named as follows:

<u>1:10,000 SCALE</u>		<u>1:1,000 SCALE</u>	
1.1	A-B = 600 ha	A-3	= 180 ha
1.2	A-4 = 600 ha	B-1	= 220 ha
1.3	B-1 = 1,000 ha	1:50,000	= 600 ha
1.4	1:50,000 = 600 ha		

TOTAL: 2,800 (± 28 Km<sup>2</sup>)

TOTAL: 1,000 ha (± 10 Km<sup>2</sup>)

\* NOTE: Area defined in the 1:50,000 map

**2. SCOPE OF WORKS**

The scope of works will be consisted by the following activities and steps.

2.1 Photogrammetric mapping in two (2) scales as follows:

1:10,000 in 4 areas: aprox. 28 Km<sup>2</sup>  
1:1,000 in 3 areas: aprox 10 Km<sup>2</sup>



**AER**

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- 2.2 Additional field survey works to check the existing lake's depth:  
± 2 section X 4 areas = 8 sections
- 2.3 G.P.S. survey to establish X, Y, Z, coordinates for geotechnical investigations sites:  
2 X 4 sites = 8 points
- 2.4 River cross sectional survey, including leveling works.  
± 48 sections
- 2.5 Aerial photography at 1:50,000 scale  
40 Km X 100 Km = 4,000 Km<sup>2</sup>

### 3. PRICE:

The total price to carry out all the job will be US Dollar four hundred, seventy one thousand and four hundred only (US\$ 471,400.00).

### 4. BREAK DOWN OF COSTS:

The above total price is composed as follows:

#### 4.1 PHOTOGRAMMETRIC MAPPING WORKS

- a) Aerial Photography at 1:30,000 and 1:6,000 scales  
US\$ 40,000.00
- b) Ground control survey for mapping at 1:10,000 and 1:1,000 scales  
1:10,000 scale (± 28 Km<sup>2</sup>) = US\$ 30,000.00  
1:1,000 scale (± 10 Km<sup>2</sup>) = US\$ 120,000.00
- c) Stereo restitution works  
1:10,000 scale (± 28 Km<sup>2</sup>) = US\$ 17,000.00  
1:1,000 scale (± 10 Km<sup>2</sup>) = US\$ 15,000.00 X 10 = US\$ 150,000.00

Total item 4.1 = US\$ 357,000.00

#### 4.2 ADDITIONAL SURVEY WORKS

- a) Existing lake's depth investigation  
± 8 sections X US\$ 300.00 = US\$ 12,400.00
- b) G.P.S. survey for geotechnical investigation sites  
8 X US\$ 1,000.00 = US\$ 8,000.00



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c) River cross sectional survey including levelling works  
 $\pm 48 \times \text{US\$ } 500.00 = \text{US\$ } 24,000.00$

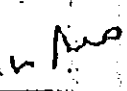
d) Aerial photography at 1:60,000 scale:  
 $4,000 \text{ Km}^2 \times \text{US\$ } 20.00 = \text{US\$ } 80,000.00$

Total of item 4.2 = US\$ 114,400.00

6. WORK SCHEDULE:

The necessary time to complete all the job will be 120 days as shown in the attached time schedule.

Best regards,

  
BASE AEROFOTOGRAFIA E PROJETOS S/A  
MASSAYOSHI ABBADO

ITEM	MONTH			
	01	02	03	04
1. Aerial photography 1:30,000 and 1:50,000	██████████			
2. Aerial photography 1:50,000	██████████	██████████		
3. Ground control survey for mapping at 1:10,000 and 1:1,000 scale	██████████	██████████		
4. Stereo restitution at 1:10,000 and 1:1,000 scale		██████████	██████████	
5. Additional survey works		██████████		



### 3. 質問状及び収集資料リスト

I. Topographic Map & Mapping

Item	Description	Availability	Remarks
1. Topographic map covering - Ararangua River Basin - Urussanga River Basin - Tubarao River Basin	The following maps with the scale of 1:50,000 cover the project area : BON JARDIM DA SERRA, ORLEAES, TUBARAO, LAGUNA, SAO BENTO BAIXO, CRICUMAJAGUARUNALOGOA DE GAROPABA DO SUL, TURVO, ARARANGUA, RINCAO	A	Primary edition / 1976 (IBGE)
2. Topographic map covering - the Study area	-Scale 1:10,000 Available only for Fiorita, Carvao, and Rocinha	A	Edition 1956
3. Geological map & reports	Geological map of Santa Catarina Province (Scale 1:500,000)	A	Edition 1986
4. Aerophotograph	Old aerophotographs with the scale of 1:20,000 seem to be available but not identified		
5. Survey data	-List & data of triangulation net for the Study area -List & data of leveling net for the Study area -List & data of bench-marks near the Study area		Not identified Not identified Not identified
6. Local contractors	-for Aerial photogrammetric mapping -for Ground survey -for Geological survey (boring/ core sampling)	A	Sao Paulo / BASE Curitiba / ESTEIO
7. Current price	-for Aerial photogrammetric mapping (s=1:10,000) -for Ground survey (s=1:1,000)		

Note: A=available, NA=not available

II. Meteorological and Hydrological Data

Item	Description	Availability	Remarks
1. Weather	- Temperature, humidity	A	Available at EPAGRI
2. Evaporation	Record is only available at EPAGRI Urucanga office	A	Available from EPAGRI & DNAEE
3. Precipitation	- Rainfall gauging station	A	Available from EPAGRI & DNAEE
- Location	- Type of data (hourly, daily, monthly) & record		
- Observation period			
4. Sedimentation	- Sediment observation station	NA	
- Location			
- Suspended material			
- Bed load material			
5. River flow		A	Available from DNAEE
- Location	- River gauging station		Available from DNAEE
- Observation period	- Flow data, minimum flow		Not identified
- Flood measurements	- Recorded maximum flood		Not identified
6. Water intake	- Location, type of usage, intake volume, water quality		Not identified
7. Groundwater	- Location, type of usage, intake volume, water quality		Not identified
8. Local Agent for hydrological Equipment	- Automatic rain gauge & water level recorder, current meter, evaporation pan		Not identified
9. Current price	- Automatic rain gauge & water level recorder, current meter, evaporation pan		Not identified

Note: A=available, NA=not available

III. Environmental Monitoring

Item	Description	Availability	Remarks
1. Water quality analysis Quantity / 70,420 nos. Analysis item Capacity of analysis	SO <sub>4</sub> , Fe, Mn, Zn, SS, CN, Hg, P, Pb, Cr, As, Cd, Acidity, and other environmental standard items <i>capable but required to increase the number of stuff</i>		UNESC
2. Costs for analysis Unit price	<i>Refer to the attached list</i>		UNESC
3. Counterpart personnel Required man-day Availability of personnel	Water quality tests and flow measurement on sites, sampling and delivery 1,036 man-day / year	A	FATMA
4. Cross sectional survey Work period Cost	Monitoring point and flow measurement point / 43 points	A	BOSE
5. Preliminary survey for coal mines Licensed plan & actual record Effluent / flow measurement device	Coal mines shutdown and in operation, coal dressing plants and related facilities Primary unit for (washing) water requirement Primary unit for effluent Waste water treatment system Availability, cost	A NA	DAMP Not identified
6. Others River bed material sampler Computer	Availability, cost Model, capacity, software for statistical analysis--availability	A	Not identified

Note: A=available, NA=not available

IV. Recuperation Planning

Item	Description	Availability	Remarks
1. Unit cost			
(1) Topo. Survey	Scale: 1:10,000 Scale: 1:1,000	A	Survey method, Equipment, Work period, Cost
(2) Laboratory tests	Neutralization agent / Screening test Chemical type Biological type	A	Equipment, Work period, Cost
Tests for coal washery waste	Sieve analysis Specific gravity Combustible material	A	
Others			
(3) Laboratory analysis	Work item Instrument Laboratory space & personnel Cost	A	Chemical
2. Data & information			
(1) Reforestation tests	Location Specimen Type of soil		To be presented during the Feasibility Study
(2) Neutralization test			
3. Computer	Available model Location Available software	A	Detail is not identified
Cost	Mapping Earthwork		
4. Boring	Work period Cost	A	PWF, SWF, WWF, NQ Detail is not identified

Note: A=available, NA=not available

収集資料リスト

No.	区分	資料名	適用	数量
1	地形図 1:50,000	Criciúma, Orleans, Sao Bento Baixo, Jaguaruna, Turvo, Rimcao Bom Jardim da Serra, Ararangua, Laguna, Lagoa de Garopaba do Sul	IBGE/1976	各1枚(計10枚)
2	1:10,000	Comissao Executiva do Plano do Carvao Nacional Folha - <i>Lauro Müller, Doze, Sideropolis, Santana, Guath, Primeira Linha,</i>	DNPM/1956	各1枚(計6枚)
3	炭鉱鉱区 位置図	1:50,000 - <i>Criciúma, Orleans</i>	DNPM	各1枚(計2枚)
4	"	・ Levantamento Da Situacao Das Minas E Concessoes Da Bacia Carbonifera De Santa Catarina (1/20,000) - ORLEAES-A3 - ORLEAES-A4 - CRICIUMA-A1	DNPM	各1枚(計2枚)
5	"	・ Planta Da Superficie-SANTANA - (1/2,000)	DNPM	1枚
6	選炭場採坑 システム	<i>Unidade Mineira II - Verdinho</i>	DNPM	図面1枚
7	パンフレット	カンタリ - 州花紙堂(英文)	T-9091-111	2部
8	報告書	<i>Informacoes Básicas para a Gestao Territorial</i>	CRPM	リジナル 1部
9	"	" - <i>Pedologia</i>	CRPM	リジナル 1部
10	"	" - <i>Áreas de Proteção Legal</i>	CRPM	リジナル 1部
11	"	" - <i>Qualidade das Águas Superficiais</i>	CRPM	リジナル 1部
12	"	PROGRAMA DE PROTEÇÃO E RECUPERAÇÃO AMBIENTAL DA BACIA HIDROGRÁFICA DO RIO TURBANAÇÃO E COMPLEXO LAGUNAR.	FATMA	1部









JICA