

8.4 水力発電設備の調査計画

8.4.1 F/S候補地点の修復計画

F/S候補の水力発電所を修復計画別に分類すると次の通りである。

(1) 定格出力まで回復する地点

- Caracoli	回復後の出力	3,300kW	Antioquia 県	(稼働中)
- P.Guillermo	回復後の出力	1,100kW	Boyaca 県	(停止中)
- Florida - I	回復後の出力	2,400kW	Cauca 県	(停止中)
- Rio Iquira - I & II	回復後の出力	5,600kW	Huila 県	(稼働中)

(2) 定格出力以上に出力増加が期待される地点

- Chinchina 川水系の San Cancio, Intermedia および Municipal	改修後の出力	8,600kW	Caldas 県	(稼働中)
- Julio Bravo	改修後の出力	2,300kW	Narino 県	(停止中)
- Zaragoza	改修後の出力	3,500kW	Santander 県	(稼働中)
- Lagunilla	改修後の出力	4,300kW	Tolima 県	(停止中)

8.4.2 調査項目および内容

(1) 既調査結果及び既存資料の検討

(2) 現地調査

① 修復計画地点踏査

修復計画地点の修復対象を確認し、修復或は補修規模の検討、修復構造物の基本レイアウト及び工事計画の策定等に必要な現地踏査を行う。

② 水文および気象に関する調査

修復計画地点の地域内にある測水所で観測期間がまだ10年未満か、欠測のあるものについては関連する流域の内外に存在する気象観測所及び測水所の水文気象資料の収集整理を行い水文特性を充分把握する。

a. 雨量及び気象観測

既設気象観測所の調査は次の項目について実施する。

- 資料の存在状態（観測期間、欠測状態、記録の保存状態）
- 観測方法及び観測条件
- 資料精度

b. 流量

既設測水所の調査は次の項目について実施する。

- 測水所の立地条件（河状の安定性、河床変動の状況、不規則な水位変化の有無）
- 観測方法及び観測条件（水位流量曲線、測水方法、観測期間、欠測期間、記録の保存状態）
- 資料精度

- ③ 地質調査
地質に関連する現地調査は補修計画箇所を含む周辺地域の地形、地質の概況を把握するため地形測量図（ $s = 1/1,000$ ）を用いて対象地域の踏査を行なう。
- ④ 電力需給調査
電力需給調査は次の項目について情報・データを収集し分析・検討を行う。
 - a. 電力需給、変電所及び送電線の現状と将来計画
 - b. 電力消費量の推移、ピーク電力および需要電力量の将来予測
- (3) 調査工事計画書、技術仕様書及び特記仕様書の作成
修復計画に必要な調査工事（地形測量、ボーリング等）の計画立案ならびに調査工事の技術仕様書及び特記仕様書を作成する。
- (4) 調査工事
 - ① 地形測量
修復計画に必要な箇所の地形図と縦横断図を作成する。
 - ② ボーリング
修復計画に必要な箇所に地質調査用のボーリングを実施する。
- (5) 修復設計
前述の調査結果にもとづいて次の作業を実施する。
 - ① 修復計画
技術的、経済的見地から考えられる修復計画の比較検討を行い最適修復規模を選定し修復計画を立案する。
 - ② 予備設計
水力発電設備、送変電設備及び工事用仮設備について予備設計を行う。
 - ③ 施行計画
主要な補修工事についての施行計画と資機材輸送計画を立案する。
 - ④ 建設費の積算
工種別、内外貨別建設費の積算及び年度別支出計画を作成する。
 - ⑤ 建設工程
工種別にバーチャートによる工程表を作成する。
 - ⑥ 経済・財務分析
修復計画の経済性の分析評価を行ない、経済的内部収益率を算定するとともにその感度分析を行う。また財務的内部収益率を算定するとともにその感度分析を行う。

8.5 調査団員の構成及び調査スケジュール

調査団の団員構成は総括1名、発電土木3名、水文1名、地質1名、電気2名、機械1名及び経済1名の計10名を予定する。

(仮) 調査工程は表8.5.1に示すように18ヶ月を予定する。

各調査対象地点における地形測量等の範囲及びコアボーリング調査工事の概要を示すと次の通りである。

(1) 地形測量

表 8.5.2 修復又は改修地点別測量範囲

地点名	路線測量 (km)			地形測量 (ha)				計
	導水路	水圧管路	小計	取水設備	導水路	築地所	その他	
Caracoli	-	1.2	1.2	0.4	-	1.0	0.3	1.7
P.Guillermo	0.4	0.2	0.6	-	-	1.0	0.6	1.6
San Cancio	4.0	0.1	4.1	0.3	8.0	1.0	0.6	9.8
Intermedia	4.0	0.2	4.2	-	8.0	1.0	0.6	9.6
Municipal	4.6	0.2	4.7	0.3	9.0	1.0	0.6	10.8
Florida-I	5.0	0.1	5.1	0.4	10.0	1.0	0.3	11.7
Rio Iquira-I	3.6	0.8	4.4	-	-	-	3.0	3.0
Rio Iquira-II	4.3	0.6	4.9	-	-	-	-	-
Julio Bravo	2.5	0.2	2.7	0.3	5.0	1.0	0.9	7.2
Zaragoza	1.8	0.1	1.9	0.3	3.6	1.0	0.6	5.4
Lagunilla	0.1	0.4	0.5	0.2	0.2	1.0	1.3	2.7
計	30.2	4.1	34.3	2.2	43.8	9.0	8.6	63.6

(2) コアボーリング調査

表 8.5.3 修復又は改修地点別ボーリング調査数量

地点名	取水塔		沈砂池		場所別 水塔及び水圧管路		発電所		計	
	本数	延長	本数	延長	本数	延長	本数	延長	本数	延長
Caracoli	1	10	1	10	-	-	1	10	3	30
P.Guillermo	-	-	-	-	4	40	1	10	6	50
San Cancio	1	10	1	10	1	10	1	10	4	40
Intermedia	1	10	1	10	1	10	1	10	4	40
Municipal	1	10	1	10	1	10	1	10	4	40
Florida-I	1	10	1	10	-	-	1	10	3	30
Rio Iquira-I	-	-	-	-	10	100	-	-	10	100
Rio Iquira-II	-	-	-	-	-	-	-	-	-	-
Julio Bravo	1	10	1	10	1	10	1	10	4	40
Zaragoza	1	10	1	10	1	10	1	10	4	40
Lagunilla	1	10	1	10	1	10	1	10	4	40
計	8	80	8	80	20	200	9	90	46	460























 Work in Colombia by ICEL
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Table 8.5.1 Tentative Study Schedule and Job Assignment

Work Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1. Review of Previous Studies & Existing Data Analysis																			
2. Site Reconnaissance																			
3. Programming of Field Works																			
4. Preparation of Field Works																			
5. Field Works																			
(1) Ground Survey																			
(2) Core Boring Investigation																			
6. Evaluation of field Works & Site Reconnaissance																			
7. Comparative Study of Alternative Schemes																			
8. Study of Optimum Plan																			
9. Design for Rehabilitation																			
10. Study of Construction Method																			
11. Estimation of Construction Cost																			
12. Economical & Financial Analyses																			
13. Formulation of Monitoring & Inspection System																			
Report																			
1. Inception Report																			
2. Technical Specification of Field Works																			
3. Progress Report																			
4. Draft Final Report																			
5. Final Report																			

附 属 資 料

附属資料 I) 調査対象地点一覧表

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APPENDIX I Candidate Power Plants for Pre F/S

(1) Thermal Power Plants

No. Department	Electric Company	Power Plant	Installed Capacity (kW)	Generating Facility		Available Capacity (kW)		Generator Voltage (kV)	Distribution (kV)	Remarks	
				Installed Year	Type	No. of Unit	Unit Capacity (kW)				Total Unit
		Termo- paipa #I		1958	Steam Turbine	1	33,000	30,000	13.2		
									66		
									115		
401	Boyaca	Termo- paipa #II	173,000	1974	Steam Turbine	1	66,000	66,000	230		
		Termo- paipa #III		1982	Steam Turbine	1	74,000	74,000	170,000	98	13.8
402	Santander	Termo- barranca #III	66,000	1978	Steam Turbine	1	66,000	40,000	40,000	61	34.5
									115		
									220		
403	Santander	Termo- palenque #IV	15,000	1972	Gas Turbine	1	15,000	0	0	0	13.2
									34.5		
									115		
Total			254,000			5		210,000		83	

APPENDIX I Candidate Power Plants for Pre F/S

(2) Hydroelectric Power Plants (1/4)

No.	Department	Electric Company	Power Plant	River	Design Data			Generating Facility			Available Capacity (kW)		General Distribution for 100 Voltage (kV)	Remarks		
					Q (m ³ /sec)	H (m)	E (kW)	Installed Year	Type of Unit	No. of Unit	Unit Capacity (kW)	Unit			Total	(%)
201	Antioquia	EADE	Caracol	Nus	5.0	86	3,200	1935	P	1	1,600	1,150	2,300	72	2.3	13.2
								1963	F	1	1,600	1,150			2.3	44
202			La Rebusca	San Roque	1.0	90	700	1932	P	1	350	250	470	67	2.3	13.2
								1934	P	1	350	220			2.3	44
203			Calera	Q. Malena	1.0	20	160	1938	P	1	80	0	64	40	2.4	7.62
								1938	P	1	80	64			2.4	
204			Rio Abajo	Negro	2.5	51	1,000	1947	P	1	500	300	600	60	2.4	13.2
								1947	P	1	500	300			2.4	
205			Piedras	Piedras	1.5	49	458	1935	P	1	250	250	250	53	0.4	13.8
								1958	F	1	208	0			0.4	
206			Sonson	Sonson	1.0	536	3,600	1967	P	1	3,600	3,600	3,600	100	6.6	44
207			Tamesis	Frio	1.2	187	1,508	1940	P	1	500	420			6.6	13.8
								1951	P	1	504	420	1,160	77	0.5	44
								1961	P	1	504	320			0.5	
208		E.P. de Urrao	Urrao	Urrao	1.5	70	824	1964	F	1	624	325	430	52	0.5	13.2
								1964	P	1	200	105			2.4	
209		E.P. de Abejorral	Abejorral	Q. Yeguas	1.0	155	724	1960	P	1	528	355	490	68	0.4	13.2
								1960	P	1	196	135			0.4	
210	Boyaca	E. Boyaca	P. Guillermo Suarez	Suarez	2.6	58	1,280	1963	F	1	640	0	0	0	0.24	22
								1963	F	1	640	0			0.24	
211	Caldas	CHC	San Cayo	Chinchiná	5.6	59.75	2,320	1929	P	1	1,350	1,000	1,750	75	4.16	4.16
								1947	F	1	970	750			4	
212			Intermedia	Chinchiná	5.6	59.01	1,120	1947	P	1	1,120	900	900	80	4	4.16
213			Municipal	Chinchiná	5.6	80.57	2,112	1945	P	1	1,056	700	1,400	66	4.3	4.3
								1945	P	1	1,056	700			4.3	13.2
214			Guacica	Guacica	4.0	67.8	1,120	1929	F	1	1,120	0	0	0	4.16	33
215		E.P. de Salamina	Salamina	Q. Frisolera Q. Palo	0.4	85	280	1943	P	1	280	140	140	50	4	4
								(Assumed)			(Assumed)					
216		E.P. de Anserma	Anserma	Anserma												*2

(2) Hydroelectric Power Plants (2/4)

No.	Department	Electric Company	Power Plant	River	Design Data			Generating Facility			Available Capacity (kW)		Generator Distribution		Remarks			
					3Q (m ³ /sec)	H (m)	(KW)	Installed Year	Type of Unit	No. of Unit	Unit Capacity (kW)	Total Capacity (kW)	Total x100 Voltage (kW)	Total x100 Voltage (%)		Generator Voltage (kV)	Generator Distribution (%)	
217	Risaralda	EPF	Belmonte	Otun	6.0	115	3,760	1941	P	1	1,880	1,650	3,300	88	2.4	2.4	13.1	17.3
								1941	P	1	1,880	1,650			2.4			
218			Dos Quebradas	Otun	10.0	113	8,500	1955	F	1	4,250	4,100	8,200	96	4.16	4.16	33	13.2
								1955	F	1	4,250	4,100			4.16			
219		E.P. de Santa Rosa	Santa Rosa	San Eugenio	1.2	55	450	1927	P	1	350	139	139	31	2.4	2.4		4.16
								1927	F	1	100	0	0	0	2.4	2.4		
220	Quindio	E.P. de Armenia	El Bosque	Quindio	4.0	90	2,280	1929	P	1	2,280	0	0	0	3.3	3.3		20
221			E.P. de Calarca	Bayona	2.5	30	1,008	1952	F	1	1,008	159	159	16	6.6	6.6		6.6
222			Campestre	Quindio	2.5	54	1,120	1956	F	1	1,120	62	62	6	0.5	0.5		13.2
223			La Union	Quindio	2.5	43	1,000	1938	F	1	1,000	0	0	0	6.6	6.6		6.6
224	Cauca	CEDELCA	Sajandi	Sajandi	3.0	104	2,480	1960	P	1	800				4.4	4.4		41.5
								1960	F	1	840		1,640	66	4.4	4.4		
								1960	F	1	840				4.4	4.4		
225			El Palo	El Palo	6.0	24.5	1,440	1964	F	1	720	640	1,280	89	0.44	0.44		33
								1964	F	1	720	640			0.44	0.44		
226			Mondomo	Mondomo	2.0	29	600	1958	F	1	300	230	470	78	2.4	2.4		14.4
								1958	F	1	300	240			2.4	2.4		
227			Silvia	Piendam	1.5	31	604	1960	F	1	500	0	100	17	6.9	6.9		13
								1960	F	1	104	100			6.9	6.9		
228			Ovejas	Ovejas	7.0	24.5	900	1939	F	1	900	650	650	72	12.5	12.5		
229			Asnazu	Asnazu	1.0	134	450	1932	P	1	450	300	300	67	4.2	4.2		12.5
230			Inza	Ullucos	0.6	72	360	1971	F	1	360	0	0	0	0.23	0.23		13.2
231			Torbibio	Isabelilla	0.5	13	63	1968	I	1	63	35	35	55	0.23	0.23		13.2
232			Florida-I	Cauca	6.5	48	2,300	1956	F	1	1,150	0	0	0	0.5	0.5		11.4
								1956	F	1	1,150	0	0	0	0.5	0.5		
233	Choco	E. Choco (Mineros del Choco S.A.)	La Vuelta	Anaguada	54.0	4.8	2,000	1916	F	1	1,000	300	500	25	4.4	4.4		4.4
								1916	F	1	1,000	200	200	25	4.4	4.4		34.5

(2) Hydroelectric Power Plants (3/4)

No.	Department	Electric Company	Power Plant	River	Design Data			Generating Facility			Available Capacity (kW)			Remarks		
					3Q (m ³ /sec)	H (m)	P (kW)	Installed Year	Type #1	No. of Unit	Unit Capacity (kW)	Total Unit	Total x100 Voltage (kV)		Generator Voltage (kV)	Distribution
234	Cundinamarca	ECSA	La Salada	Bogotá	2.3	15	280	1935	F	1	280	0	0	0	4.16	
235			Río Negro	Negro	13.0	78.2	9,600	1974	F	1	4,800	3,000	4,500	47		*2
236		E.P. de Choachi	Choachi	Palmar	1.0	45	300	1954	F	1	300	19	6	0	0.38	6.6
237		ECSA (Cementos Diamantes S.A.)	Apulo	Bogotá	23.0	15	3,000	1928	T	1	600	0	0	0	6.6	34.5
238	Huila	E. Huila	La Viciosa	Q. Viciosa	0.5	45.5	225	1950	F	1	100	0	0	0		
239			La Pita	Q. Mayo	0.75	120.5	1,420	1973	F	1	700	460	1,060	75		
240			Fortalecillas	Fortalecillas	2.0	28	408	1968	F	1	408	0	0	0		
241			Río Iquira-I	Iquira	2.5	192.4	4,320	1951	P	1	1,440	1,130	2,230	52		
242			Río Iquira-II	Iquira	2.5	98.4	2,400	1954	F	1	2,400	700	700	29		
243	Meta	ENSA	El Calvario	Q. Paneta	0.04	60	20	1984	P	1	20	16	16	80	0.208	
244			San Juanito	Gujaro	0.1	53	20	1986	F	1	20	20	20	100	0.22	13.2
245	Nariño	CEDEMAR	Río Mayo-II	Mayo	12.5	218	21,000	1969	F	1	7,000	7,000	20,000	95	6.6	
246			Río Bobo	Bobo	1.8	306	4,368	1956	P	1	1,440	0	0	0	3.3	
247			Río Sapuyes	Sapuyes	2.0	107	1,856	1956	F	1	328	110	780	42	0.5	
248			Julio Bravo	Pasto	2.0	120	1,500	1942	P	1	500	0	0	0	6.9	13.2
249	Putumayo	E.P. de Mocoa	Mulato	Mulato	0.5	50	168	1964	F	1	168	0	0	0		*2

(2) Hydroelectric Power Plants (4/4)

No.	Department	Electric Company	Power Plant	River	Design Data			Generating Facility			Available Capacity (kW)		Generator Distribution		Remarks
					Q (m ³ /sec)	H (m)	P (kW)	Installed Year	Type	No. of Units	Unit Capacity (kW)	Total	Per Cent (%)	Generator Voltage (kV)	
250	Santander	ESSA	Palmas	Lebrija	17.0	150	18,000	1950	F	1	4,500	4,500	13,000	72	
								1950	F	1	4,500				
								1960	F	1	4,500				
								1960	F	1	4,500				
251			Zaragoza	Sutata	6.5	30	1,560	1931	F	1	520	0	800	51	
								1935	F	1	520				
								1948	F	1	520				
								1952	F	1	490	0			
								1952	F	1	240	0			
252			Cascada	Fonce	18.8	24.5	3,350	1939	F	1	220	0	1,300	39	
								1956	F	1	1,200				
								1963	F	1	1,200				
253			Comoda	Lenguarucu	1.3	89	880	1912	F	1	160	0	0	0	
								1912	F	1	160				
								1954	F	1	280	0	0	0	
								1954	F	1	280	0	0	0	
254			Servitá	Servitá	0.6	169.5	800	1962	F	1	400	360	720	90	0.44
								1962	F	1	400	360	720	90	0.44
255			Cañichal	Servitá	1.2	26	280	1950	F	1	125	100	220	79	2.4
								1950	F	1	155	120	220	79	0.5
256	Tolima	E. Tolima	Gualí (Honda)	Gualí	12.0	13.9	1,048	1926	F	1	748	0	0	0	4.16
								1955	F	1	150	0	0	0	2.3
								1955	F	1	150	0	0	0	2.3
257			Rio Recio	Recio	5.0	100	4,000	1960	F	1	2,000	0	1,200	30	4.16
								1960	F	1	2,000	1,200	1,200	30	4.16
258			Mirolindo	Combeima	4.7	97	3,600	1946	F	1	1,200	1,000	1,000	28	2.4
								1946	F	1	1,200	0	1,000	28	2.4
259			Pastales	Combeima Q. La Plata	3.87	30	840	1947	F	1	840	0	0	0	0.5
260			Prado	Prado	112.0	56	51,000	1974	F	1	15,300	15,300	51,000	100	6.6
									F	1	15,300	15,300	51,000	100	6.6
									F	1	15,300	15,300	51,000	100	6.6
261			Lagunilla	Lagunilla	0.5	120	(Assumed) 452	1940	P	1	300	0	0	0	4.4
262			Ventanas	Coello	25.3	28.6	6,000	1958	F	1	3,000	0	2,500	42	4.16
									F	1	3,000	2,500	2,500	42	4.16
			Total				192,416			124			131,454	68	

Notes #1 P: Pelton
 F: Francis
 T: Turbine
 #2 The site marked with (*) was not investigated.
 This data is based on the information supplied by ICEL.

(3) Diesel Power Plants (1/2)

No.	Department	Electric Company	Power Plant	Installed Capacity (kW)	Generating Facility		Available Capacity (kW)		Generator Voltage (kV)	Distribution (kV)	Remarks	
					Year	Type	No. of Units	Capacity (kW)				Unit
301			Acaadi	275	1981	Indoor	1	275	0	0	0.24	13.2
302			Pizarro	120	No Data	Indoor	1	120	120	100	0.22	No Data (*)
303			Unguia	150	1980	Indoor	1	150	150	100	0.22	13.2
304			Capurgana	150	1985	Indoor	1	150	150	100	0.22	13.2
312	E. Choco		Villa Claret	25	1983	Indoor	1	25	0	0	0.24	No Data (*)
314			Sipi	80	No Data	Indoor	1	80	80	100	No Data	No Data (*)
315			Bahia Solano	100	1978	Indoor	1	100	0	0	0.24	2.4
				140	1972	Indoor	1	140	0	0	0.24	
321			Huquí	150	1980	Indoor	1	150	0	0	0.22	13.2
-			Zapuerto	17.5	1958	Indoor	1	17.5	0	0	0.127/0.22	0.127
					1983	Indoor	1	275	275		0.22	13.2
					1971	Indoor	1	245	245		0.23	
					1987	Indoor	1	930	930		0.48	
337 Meta	ENSA		Puerto Lopez		1983	Indoor	1	240	0		0.22	
				2,220	1971	Indoor	1	145	145		0.22	
					1971	Indoor	1	145	145	89	0.22	
					No Data	Indoor	1	150	0		0.24	13.2
339			San Juan de Arama	525	1986	Indoor	1	230	230	44	0.208	
340			Vista Hermosa	455	1955	Indoor	1	225	225	100	0.23	13.2 (*)
					1977	Indoor	1	3,000	3,000		4.16	13.2
					1978	Indoor	1	3,000	3,000		4.16	
341 Nariño	CEDEMAR		Termo Tumaco	10,000	1965	Outdoor	1	2,000	2,000	78	4.16	
					1965	Outdoor	1	2,000	7,800		4.16	

(3) Diesel Power Plants (2/2)

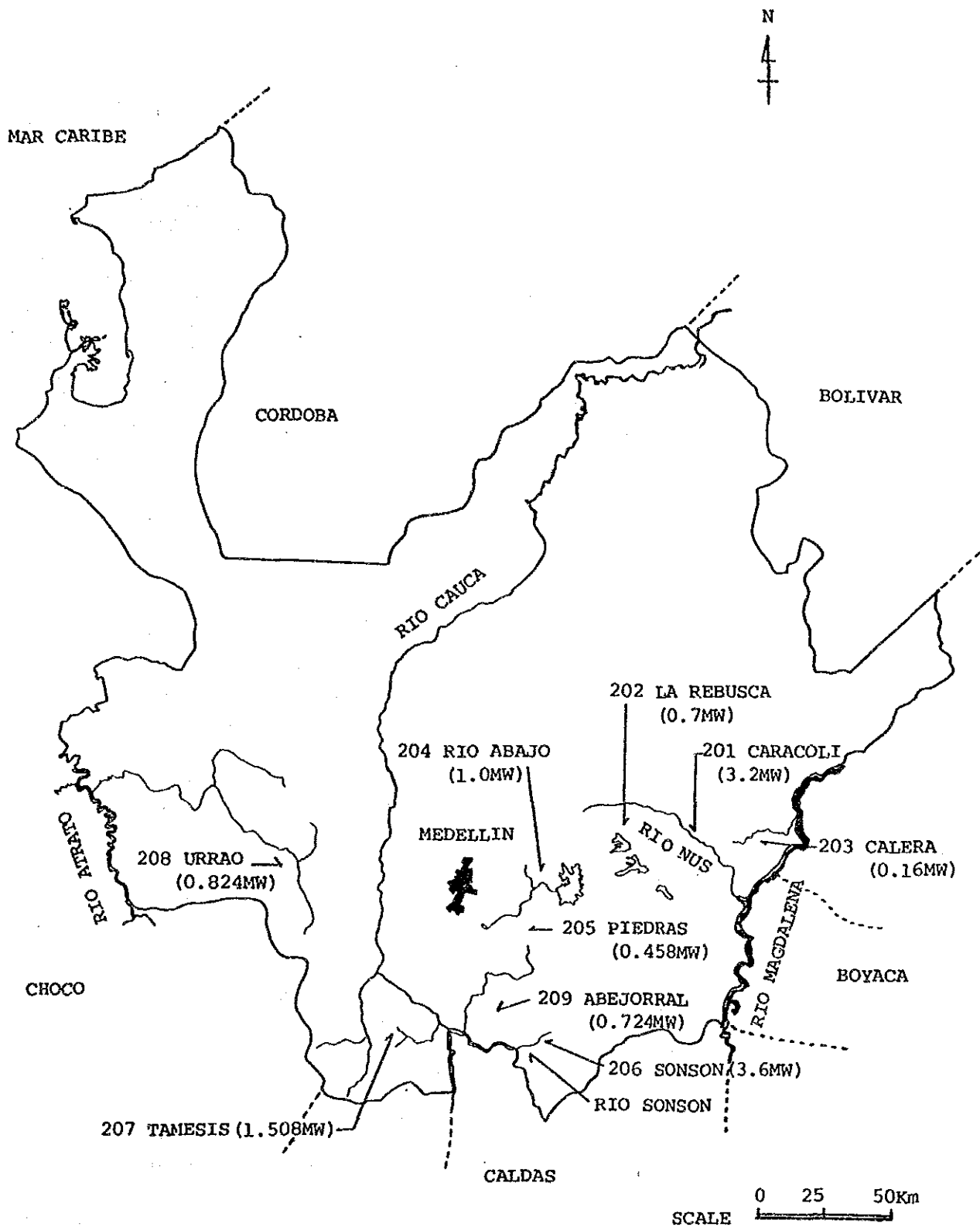
No.	Department	Electric Company	Power Plant	Installed Capacity (kW)	Installed Year	Generating Facility		Available Capacity (kW)		Generator Voltage (kV)	Distribution (kV)	Remarks
						Type	No. of Unit	Unit Capacity (kW)	Total			
344			Llorete	120	1971	Indoor	1	120	0	0	0.22	5.715
345	Narifo	CEDENAR	Sala Honda	210	No Data	Indoor	1	60	0	0	0.24	5.715
350			La Playa	75	1955	Indoor	1	150	150	71	0.24	
357			Baquerias	35	1981	Indoor	1	35	0	0	0.22	12.47
												13.2
			Total	14,847.5	-	-	31	-	-	11,015	74	-

Note: The site marked with (*) was not investigated. This data is based on the information supplied by ICEL.

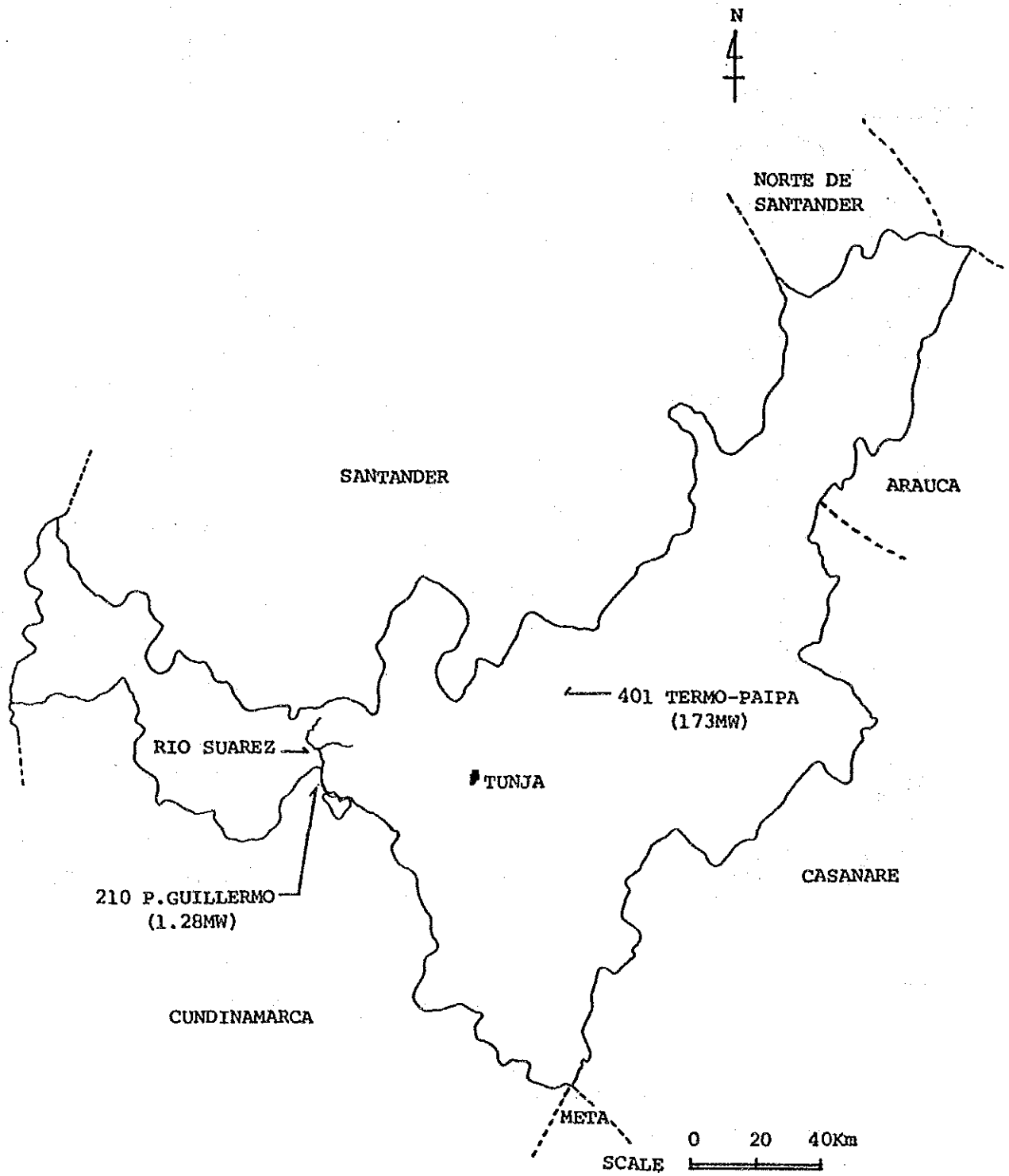
附属資料Ⅱ) 調査対象地点県別位置図

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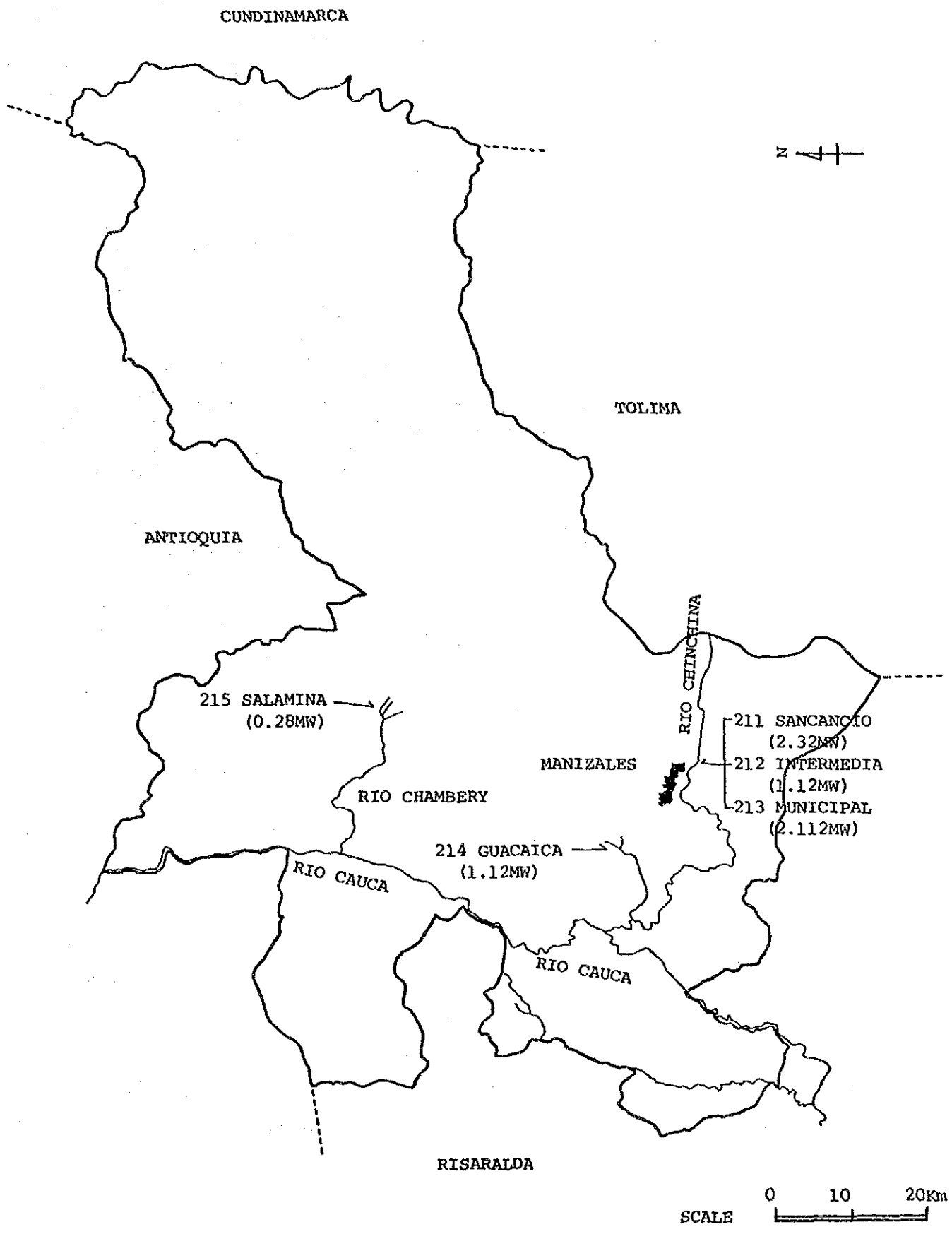
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LOCATION MAP OF STUDY SITE IN HUILA	II- 7
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LOCATION MAP OF STUDY SITE IN PUTUMAYO	II-14



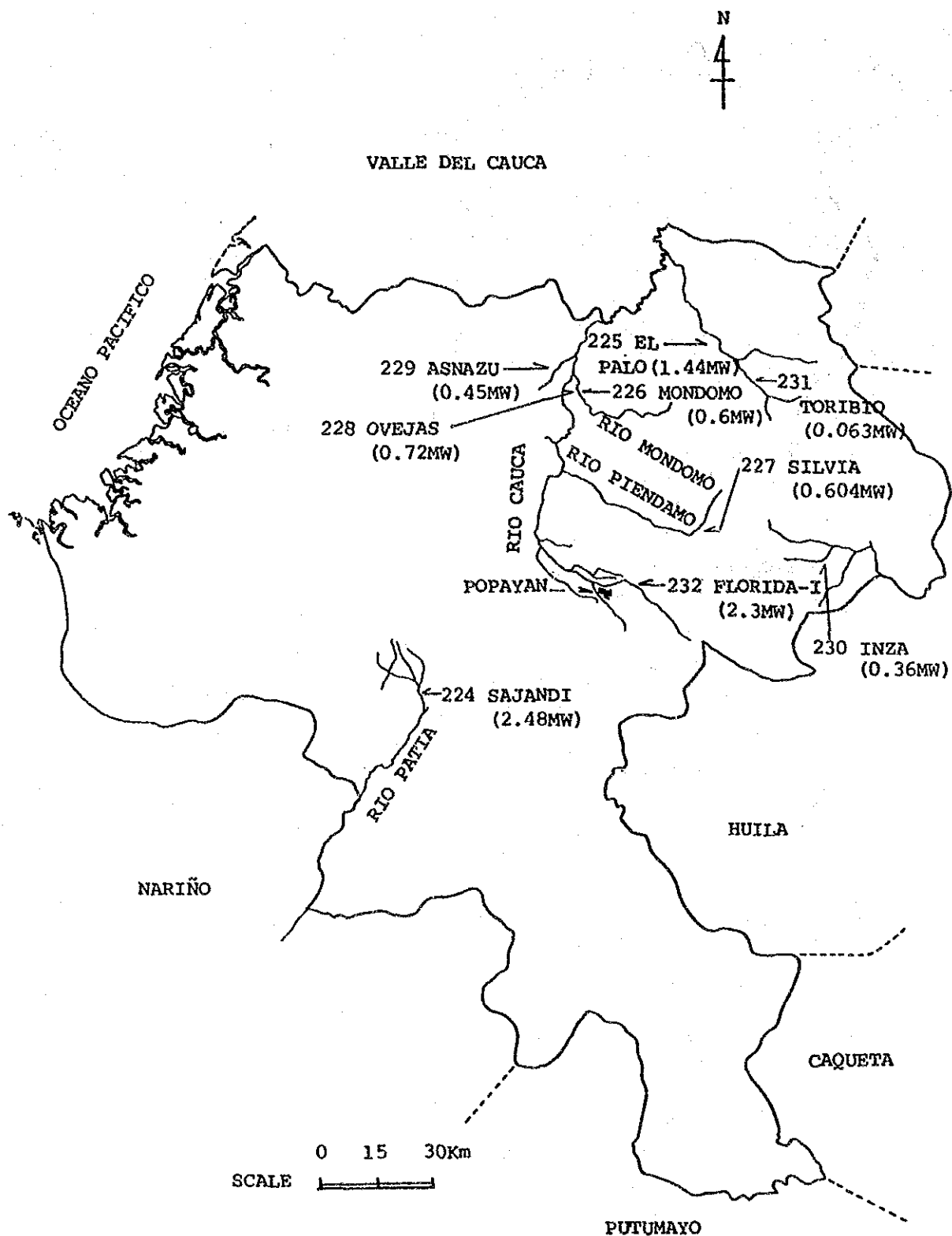
LOCATION MAP OF STUDY SITE IN ANTIOQUIA



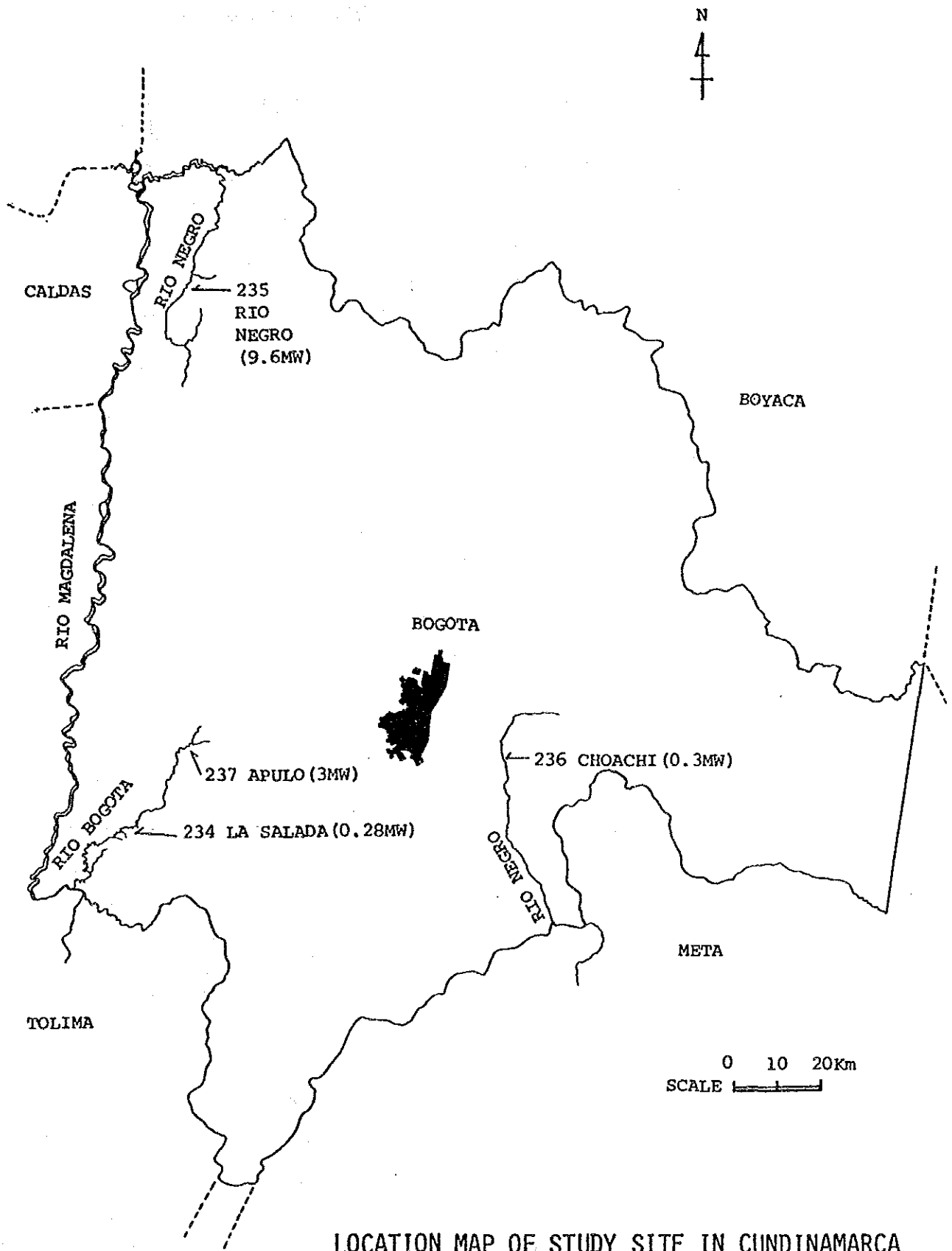
LOCATION MAP OF STUDY SITE IN BOYACA



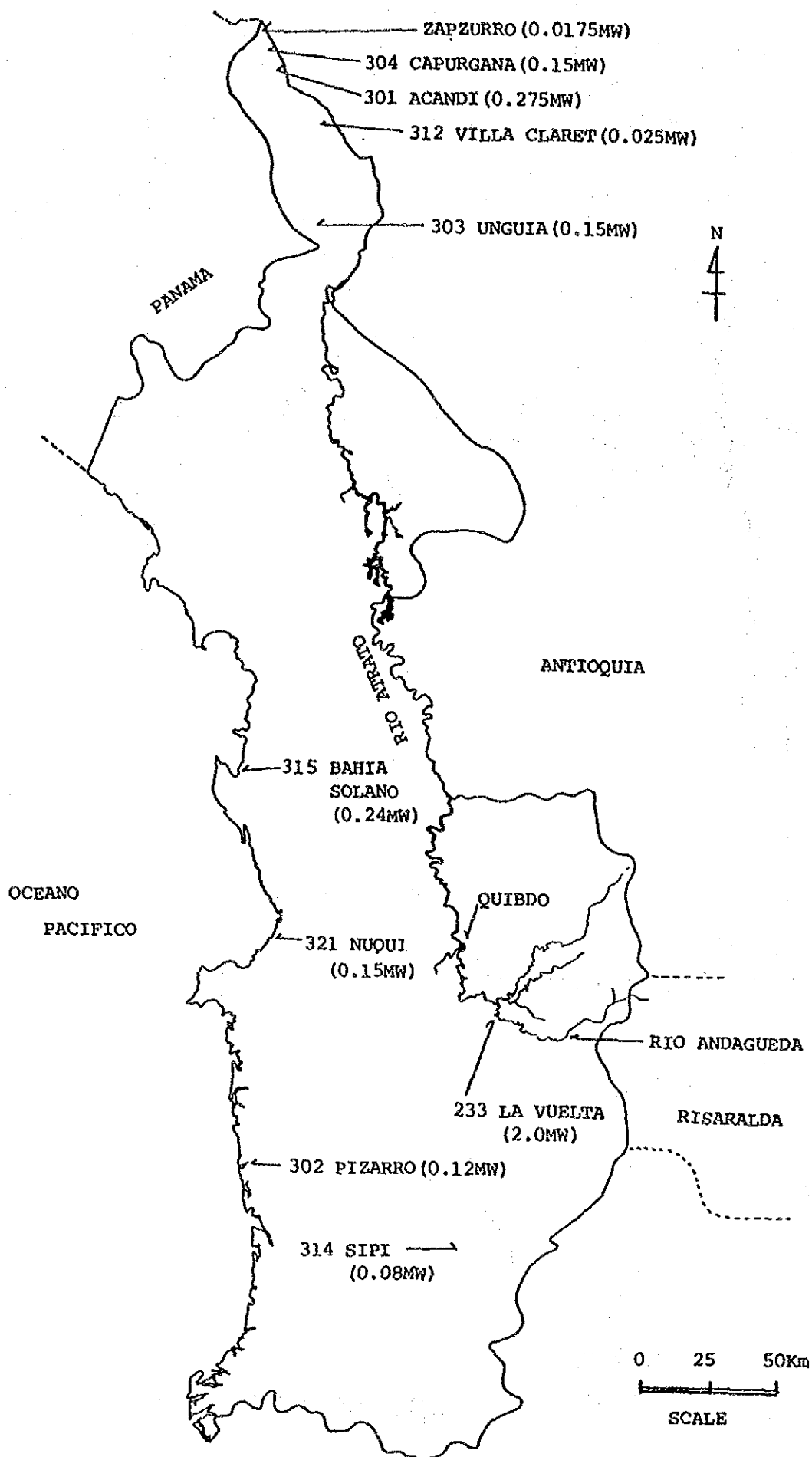
LOCATION MAP OF STUDY SITE IN CALDAS



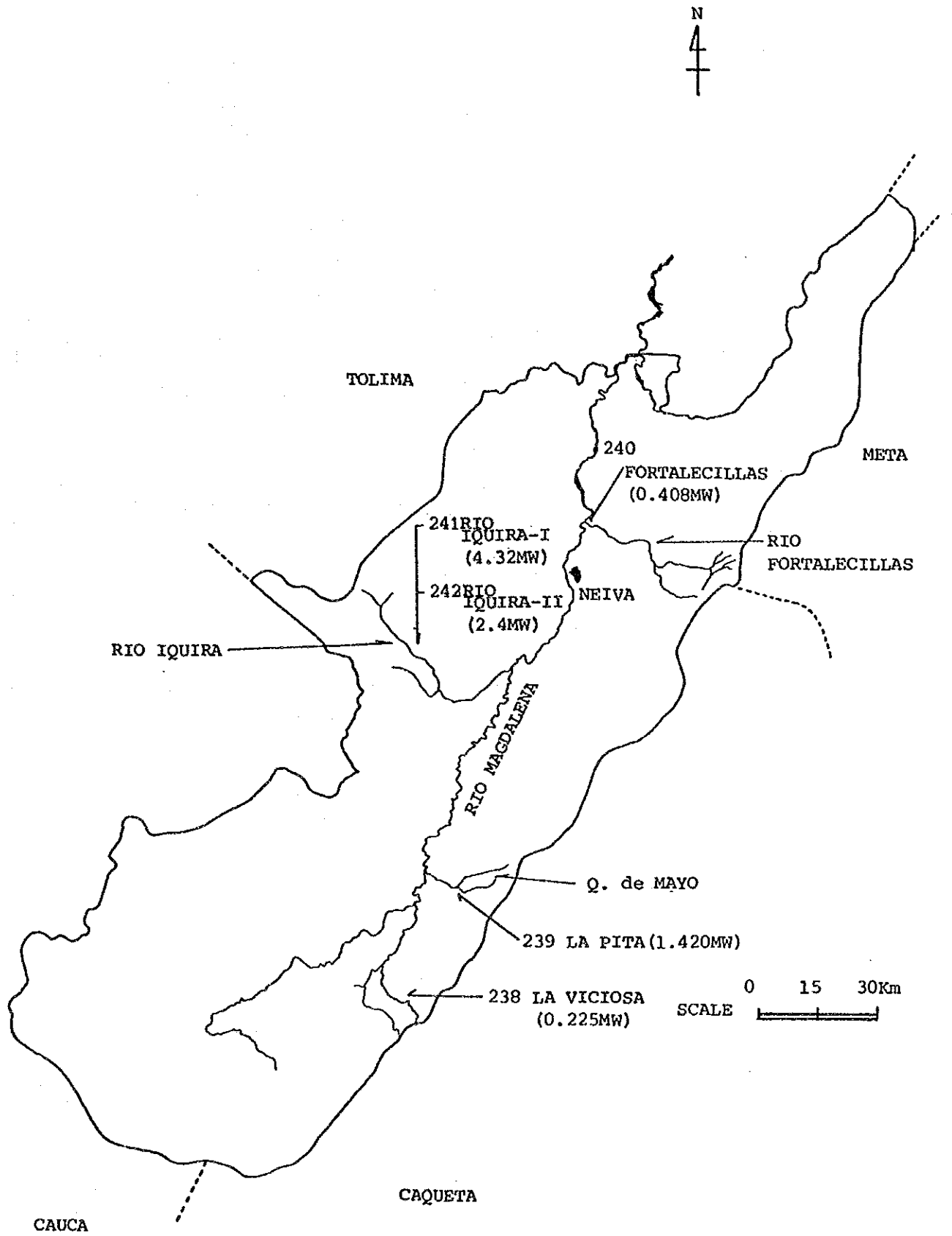
LOCATION MAP OF STUDY SITE IN CAUCA



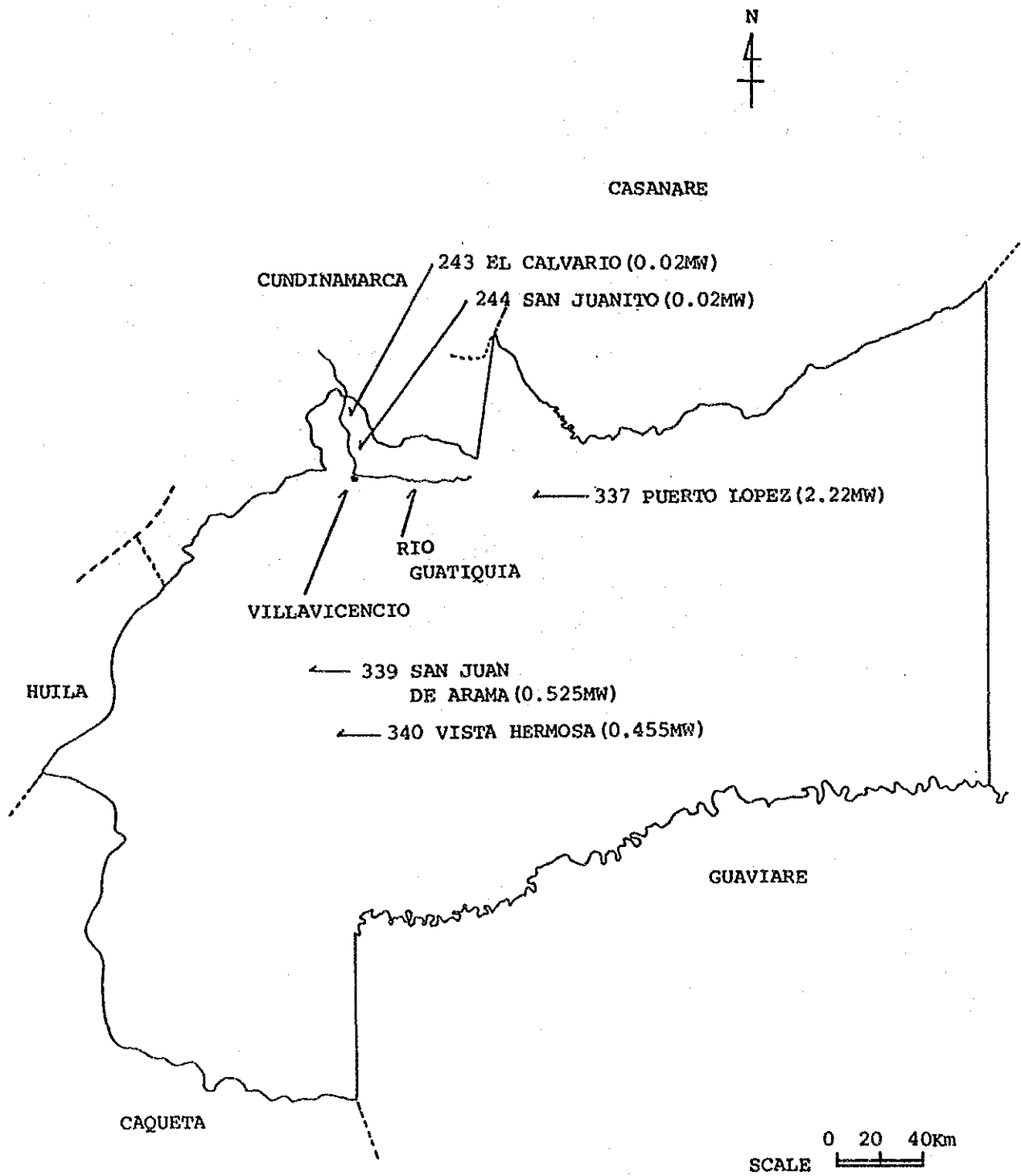
LOCATION MAP OF STUDY SITE IN CUNDINAMARCA



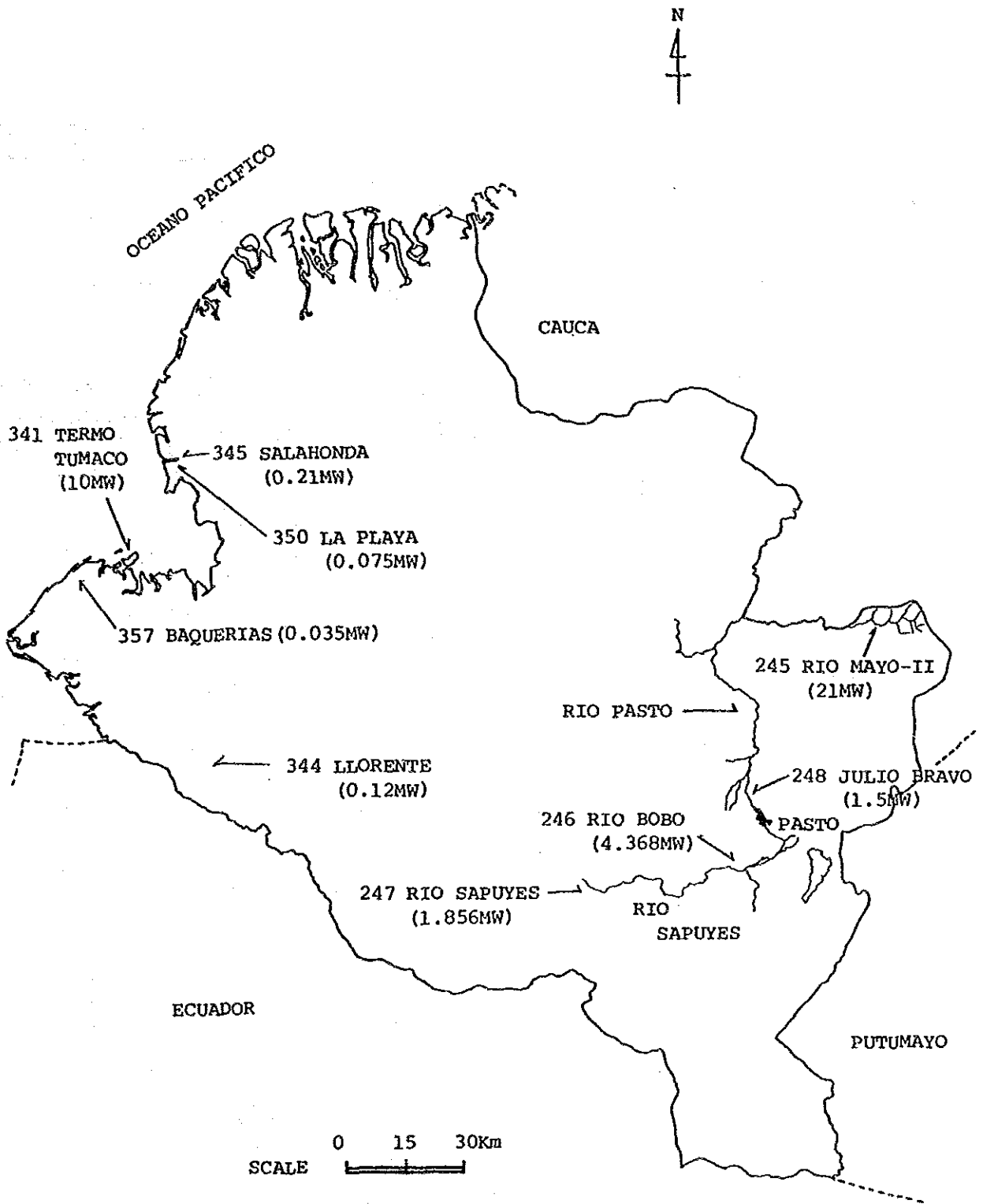
LOCATION MAP OF STUDY SITE IN CHOCO



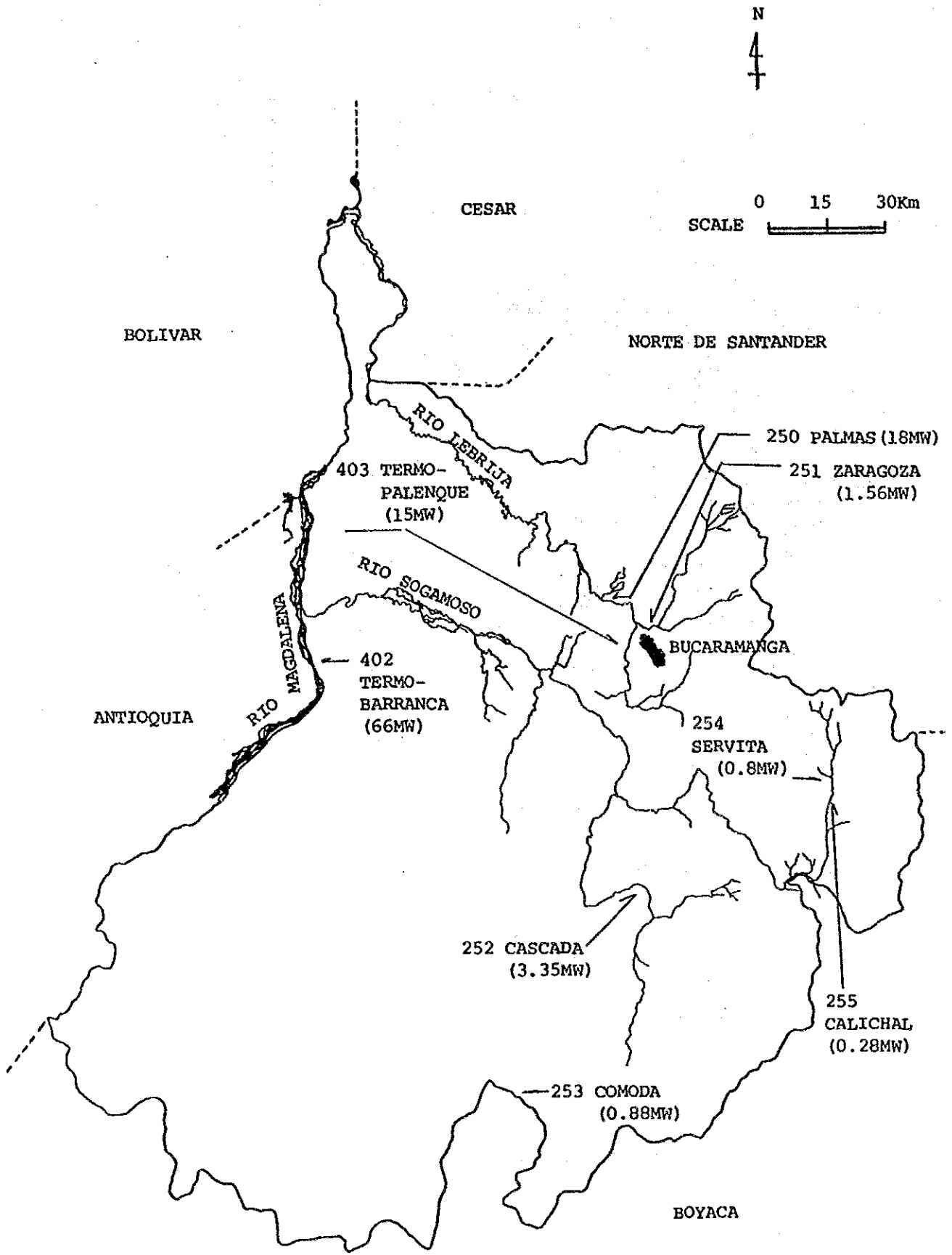
LOCATION MAP OF STUDY SITE IN HUILA



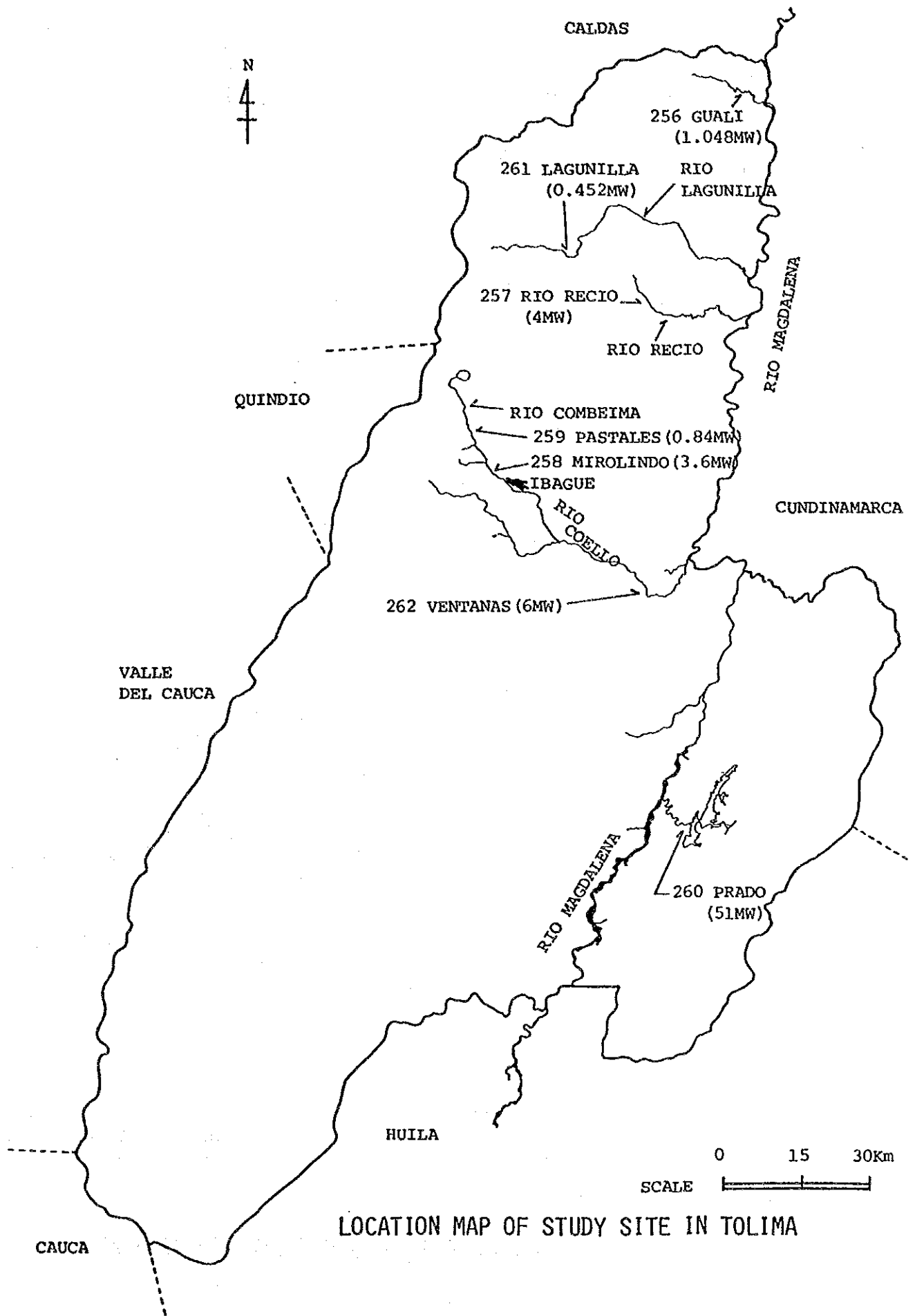
LOCATION MAP OF STUDY SITE IN META



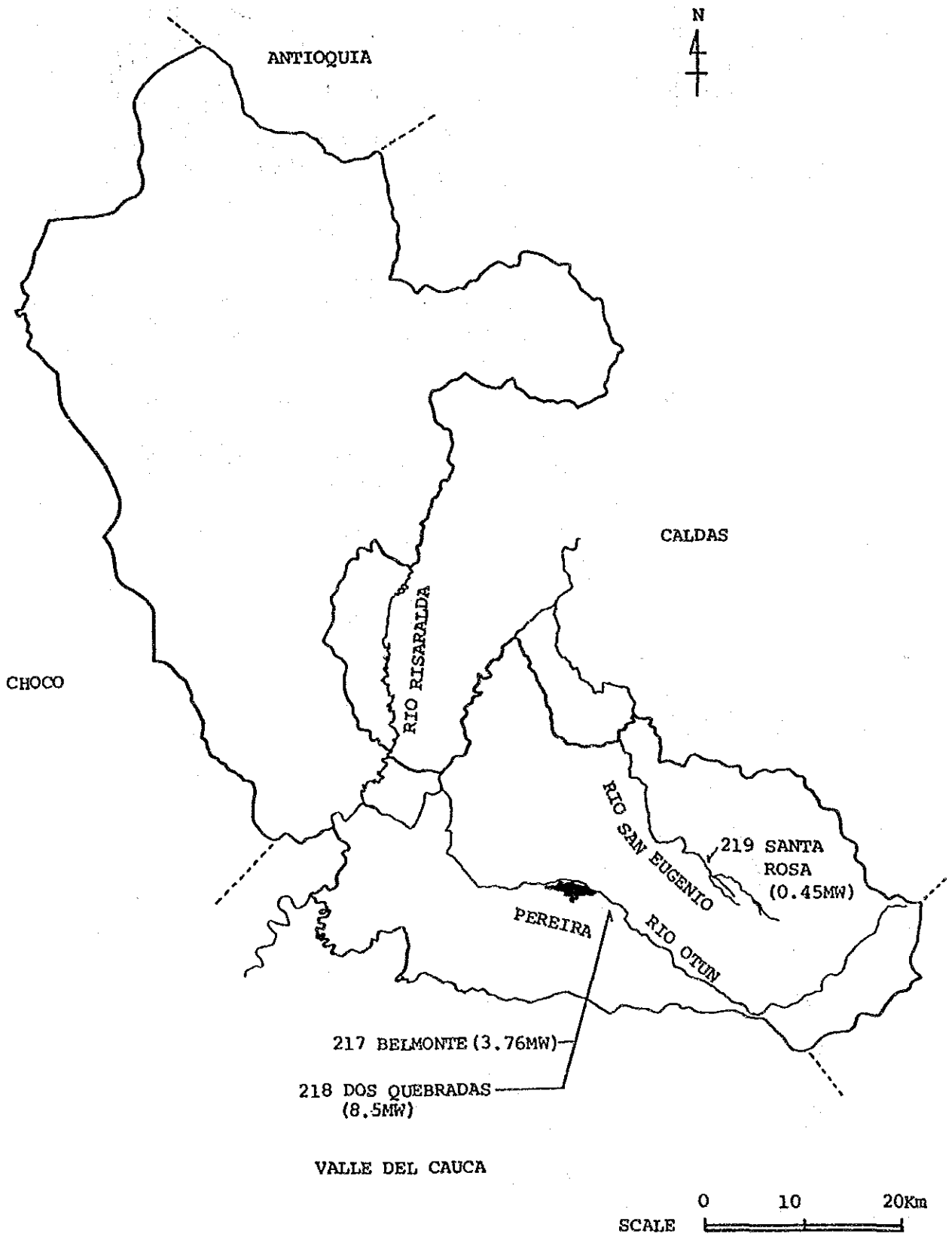
LOCATION MAP OF STUDY SITE IN NARIÑO



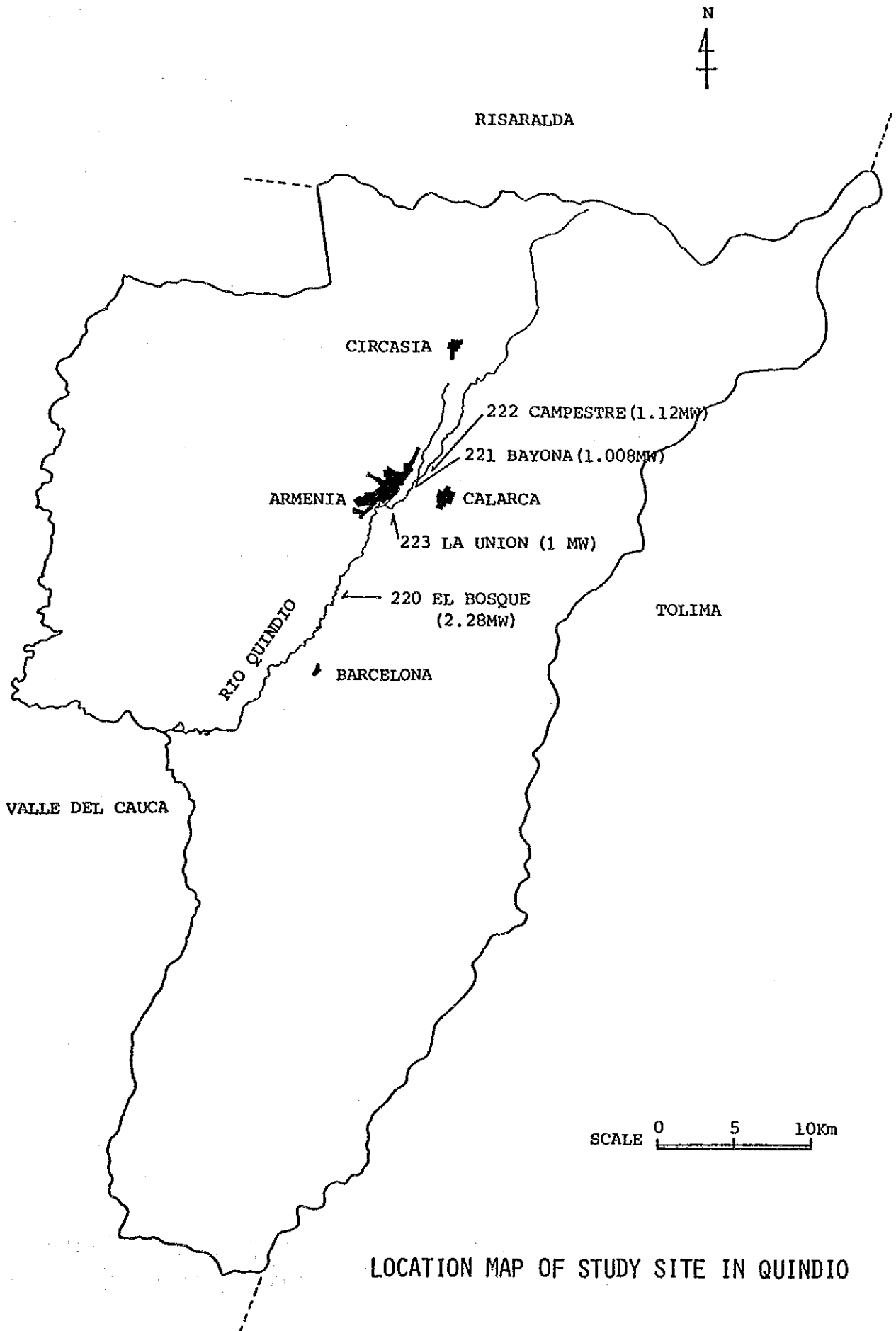
LOCATION MAP OF STUDY SITE IN SANTANDER



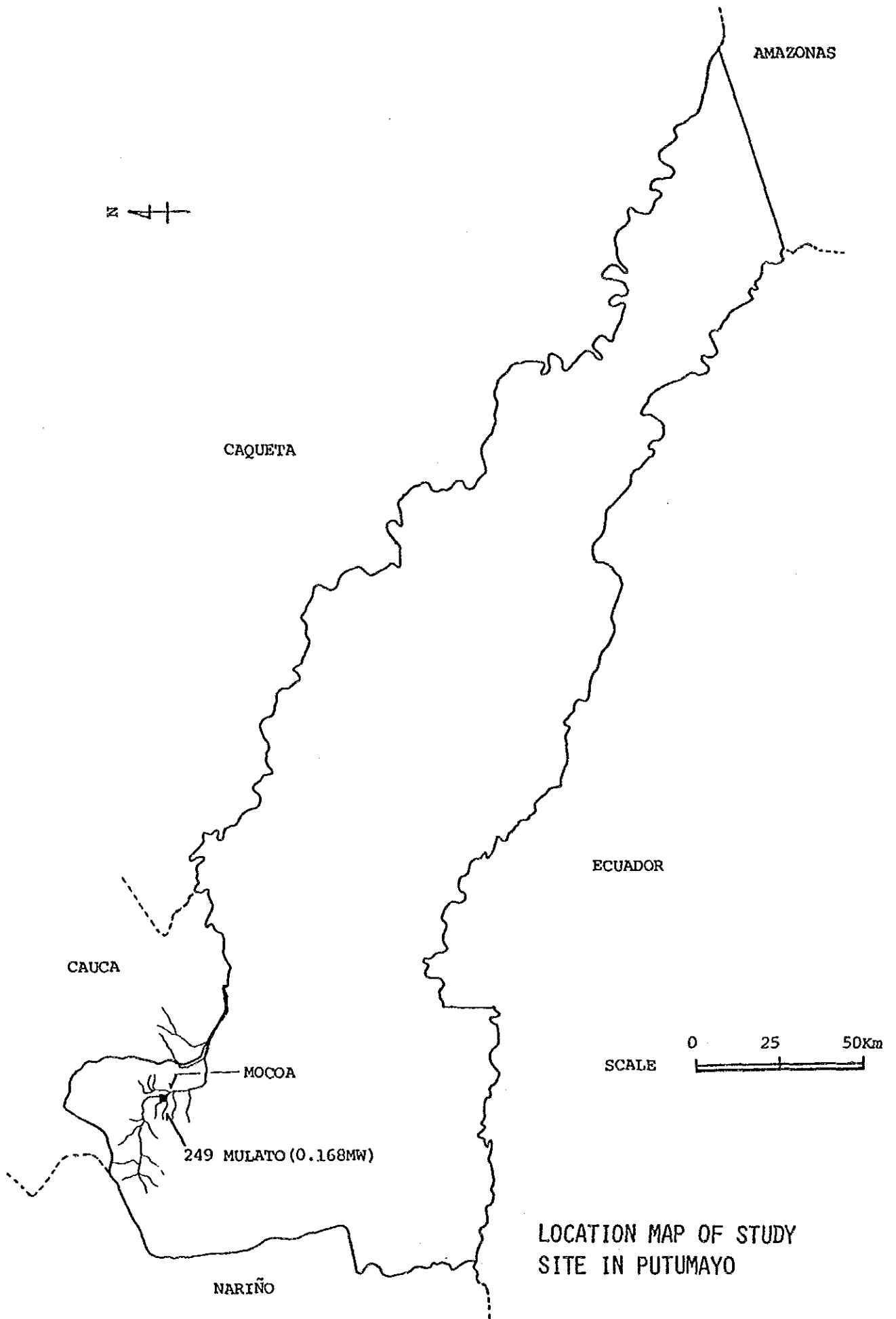
LOCATION MAP OF STUDY SITE IN TOLIMA



LOCATION MAP OF STUDY SITE IN RISARALDA



LOCATION MAP OF STUDY SITE IN QUINDIO



LOCATION MAP OF STUDY
SITE IN PUTUMAYO

附属資料Ⅲ) 収集資料リスト

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2. Present Power Demand of ICEL and Forecast of Future Demand	III-5
3. Statistical Data for Social and Economic Situations in the Republic of Colombia	III-5
4. Other Data Relevant to the Study	III-5

APPENDIX III List of Collected Data

No.	Title	Presenter or Publisher
(a)	Basic Data to be Required for Pre F/S	
1.	Report of Previous Study Survey by ICEL for Diesel and Thermal Power Plants	
-1	Inspecciones Tecnicas Adelantadas a las Plantas Localizadas en Jurisdiccion de Santander, Boyaca	ICEL
-2	Seccion Pruebas Estadistica e Informacion Informe Mensual de Actividades	ICEL (E. Boyaca)
-3	Inspecciones Tecnicas Adelantadas a las Plantas Localizadas en Jurisdiccion de Electrochoco	ICEL
-4	Inspecciones Tecnicas Adelantadas a las Plantas Localizadas en Jurisdiccion de Narino	ICEL
-5	Inspecciones Tecnicas Adelantadas a las Plantas Localizadas en Jurisdiccion de Electro Meta	ICEL
-6	Centrales Electricas de Narino S.A. Informacion Reunion Generacion por Plantas Diesel (Pasto Enero de '88)	CEDENAR
2.	Report of Previous Study Survey by ICEL for Hydraulic Power Plant	
-1	Informe General Sobre Pequeñas Centrales Hidroelectricas (EADE)	ICEL
-2	Inspecciones Tecnicas Adelantadas a las Plantas Localizadas en Jurisdiccion de EADE	ICEL
-3	Inspecciones Tecnicas Adelantadas a las Plantas Localizadas en Jurisdiccion de la Electricidad de Boyaca	ICEL
-4	Inspecciones Tecnicas Adelantadas a las Plantas Localizadas en Jurisdiccion de la CHEC	ICEL
-5	Inspecciones Tecnicas Adelantadas a las Plantas Localizadas en Jurisdiccion de CEDELCA	ICEL
-6	Identificacion y/o Recuperacion de Pequeñas Centrales Hidroelectricas Departamento del Cauca Vol. 1 Oct. '87	ICEL
-7	Identificacion y/o Recuperacion de Pequeñas Centrales Hidroelectricas Departamento del Cauca Vol. 2 Oct. '87	ICEL

No.	Title	Presenter or Publisher
(a)		
-8	Inspecciones Tecnicas Adelantadas a las Plantas Localizadas en Jurisdiccion de Electrochoco	ICEL
-9	Inspecciones Tecnicas Adelantadas a las Plantas Localizadas en Jurisdiccion de Electrocundi	ICEL
-10	Inspecciones Tecnicas Adelantadas a las Plantas Localizadas en Jurisdiccion de Electrohuila	ICEL
-11	Inspecciones Tecnicas Adelantadas a las Plantas Localizadas en Jurisdiccion de Electrometa	ICEL
-12	Inspecciones Tecnicas Adelantadas a las Plantas Localizadas en Jurisdiccion de CEDENAR	ICEL
-13	CEDENAR Informe Plan Remodelacion y Rehabilitacion Pequeñas Centrales Nov. '87	ICEL
-14	Inspecciones Tecnicas Adelantadas a las Plantas Localizadas en Jurisdiccion de Mocoa, Intend. del Putumayo	ICEL
-15	Inspecciones Tecnicas Adelantadas a las Plantas Localizadas en Jurisdiccion de Santander	ICEL
-16	Inspecciones Tecnicas Adelantadas a las Plantas Localizadas en Jurisdiccion de Electrolima	ICEL
-17	Electrificadora de Santander S.A. Informe General Centrales Hidraulicas 1987	ICEL
-18	Factibilidad de la Recuperacion y Optimizacion de la Central Hidroelectrica Florida I Feb. 1987	ICEL
-19	EADE Anexo Ampliacion de Informacion y Planos de "Sonson"	ICEL
-20		
-21	Electrificadora del Tolima S.A. Informe Obras Civiles Microcentral del Libano	ICEL
-22	Electrificadora del Tolima S.A. Informe Obras Civiles Microcentral del Miroloindo	ICEL
-23	Electrificadora del Tolima S.A. Informe Obras Civiles Microcentral del Rio Recio	ICEL
-24	Electrificadora del Tolima S.A. Informe Obras Civiles Microcentral de Pastales	ICEL

No.	Title	Presenter or Publisher
(a)		
-25	Electrificadora del Tolima S.A. Informe Obras Civiles Microcentral del la Ventana	ICEL
-26	Electrificadora del Tolima S.A. Informe Obras Civiles Microcentral de Honda	ICEL
-27	Photo de Centals Visitades	ICEL
3.	Inventory for Power Plants and Monitoring Records under the Jurisdiction of ICEL	
-1	Informe Estadistico Sector Electrico Colombiano Resumen 1981-1985	ICEL
4.	Present Conditions and Future Maintenance Program of the Substation and Transmission Line by System in This Proposal	
	La Electrificacion en Colombia 1984-1985	ICEL
	(This data is same as collected by preliminary commission)	
5.	Records of Hydrological and Meteorological Observation on the Hydraulic Power Plant Sites	
-1	Anuario Hidrologico 1985 TOMO-I	ICEL (HIMAT)
-2	Anuario Hidrologico 1985 TOMO-II	ICEL (HIMAT)
-3	Anuario Hidrologico 1985 TOMO-III	ICEL (HIMAT)
-4		
-5	Anuario Hidrologico 1985 Area Hidrografica N ^o 1 Caribe	ICEL
-6	Area Hidrografica N ^o 2 Magdalena Cauca (1 de 6)	ICEL
-7	Area Hidrografica N ^o 2 Magdalena Cauca (2 de 6)	ICEL
-8	Area Hidrografica N ^o 2 Magdalena Cauca (3 de 6)	ICEL
-9	Area Hidrografica N ^o 2 Magdalena Cauca (4 de 6)	ICEL
-10	Area Hidrografica N ^o 2 Magdalena Cauca (5 de 6)	ICEL
-11	Area Hidrografica N ^o 2 Magdalena cauca (6 de 6)	ICEL

No.	Title	Presenter or Publisher
(a)		
-12	Anuario Hidrologico 1985 Area Hidrografica N ^o 3 Orinoquia	ICEL
-13	Anuario Hidrologico 1985 Area Hidrografica N ^o 4 Amazonas	ICEL
-14	Anuario Hidrologico 1985 Area Hidrografica N ^o 5 Pacifico	ICEL
-15	Distribucion de la Precipitacion en Colombia (1961-1980) Anual Isoyetas en Milímetros	ICEL

No.	Title	Presenter or Publisher
(b)	Data for Pre F/S	
1.	Publications on the Latest Energy Policy Issued by Ministeriode Minas y Energy, Economic Planning Agency of Colombia, and ICEL)	
-1	40 Anos Electrificando a Colombia Mar. 19, 1987	ICEL
2.	Present Power Demand of ICEL and Forecast of Future Demand	
-1	Proyecciones de Demanda 1986-2006 con Modelo Econometrico Revisado (Medellin, Mayo de 1987)	ICEL (ISA)
-2	Proyecciones Regionales de Ventas y Demandas de Energia y Potencia 1986-2006 (Modelo Econometrico Revisado) Agosto de 1987	ICEL (ISA)
-3	Sistema Electrico Colombiano Balance Energetico Historico 1971-1986 Medellin, Oct. de 1987	ICEL
-4	Empresas Grupo ICEL Demanda y consumo de Energia Electrica Informacion Basica 1986-1987	ICEL
3.	Statistical Data for Social and Economic Situations in the Republic of Colombia	
-1	Colombia Estadistica 86 (DANE)	DANE
-2	XV Censo Nacional de Poblacion y IV de Vivienda (Julio de 1986)	DANE
4.	Other Data Relevant to the Study	
i)	Map	
-1	Republica de Colombia	IGAC
-2	Departamento del Antioquia	IGAC
-3	Departamento del Boyaca	IGAC
-4	Departamento del Caldas	IGAC

No.	Title	Presenter or Publisher
(b)		
-5	Departamento del Risalardas	IGAC
-6	Departamento del Quindio	IGAC
-7	Departamento del Cauca	IGAC
-8	Departamento del Choco	IGAC
-9	Departamento del Cundinamarca	IGAC
-10	Departamento del Huila	IGAC
-11	Departamento del Meta	IGAC
-12	Departamento del Narino	IGAC
-13	Departamento del Putumayo	IGAC
-14	Departamento del Santander	IGAC
-15	Departamento del Tolima	IGAC
-16	Departamento del Caqueta	IGAC
ii) Other		
-17	Estudio Para la Rehabilitacion de la Central Hidroelectrical el Bosque	CHEC
-18	Calculo Tuberias de Presion de las Plantas Hidroelectricas (San Cancio, Intermedia, Municipal, Guacaica)	CHEC
-19	Estudio de la Subcuenca del Rio Chinchina	CHEC

附属資料Ⅳ) 発電設備台帳 (別冊)

JICA