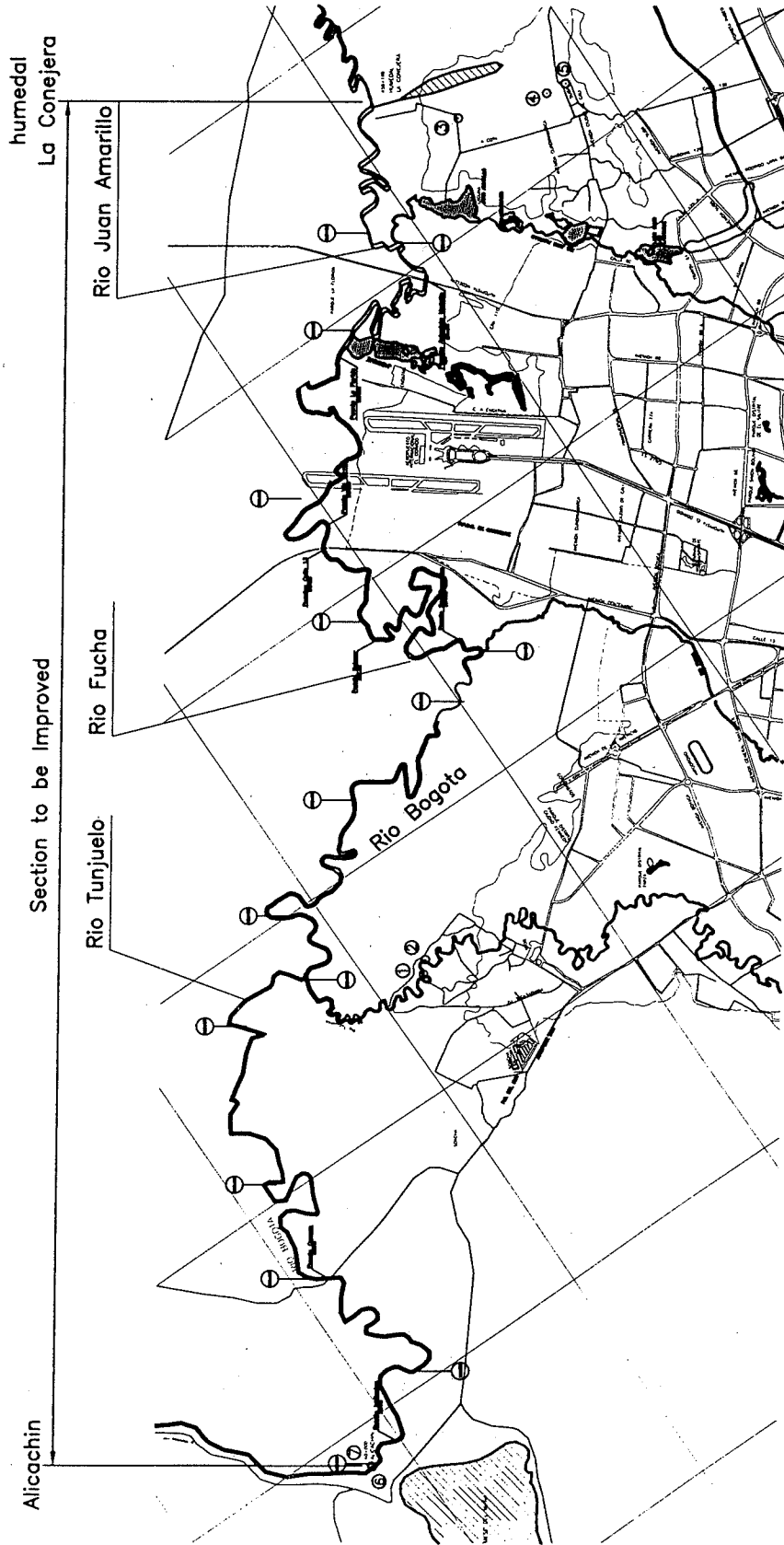


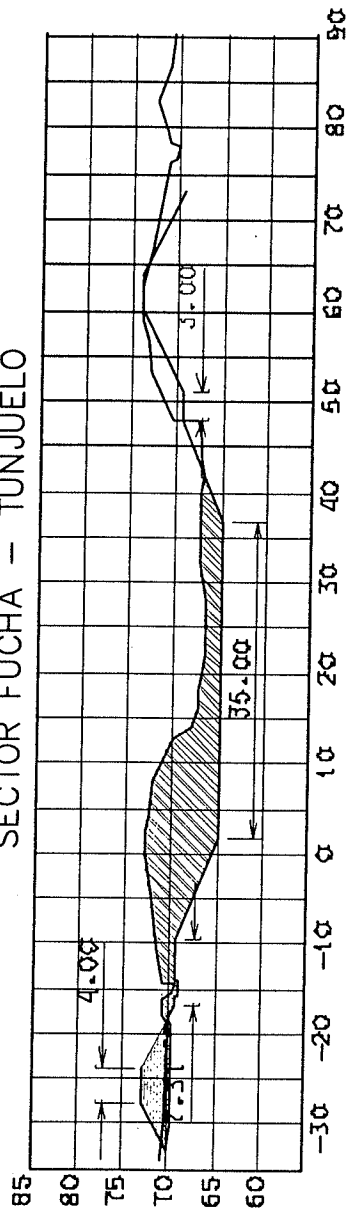
Appendix for Chapter 5



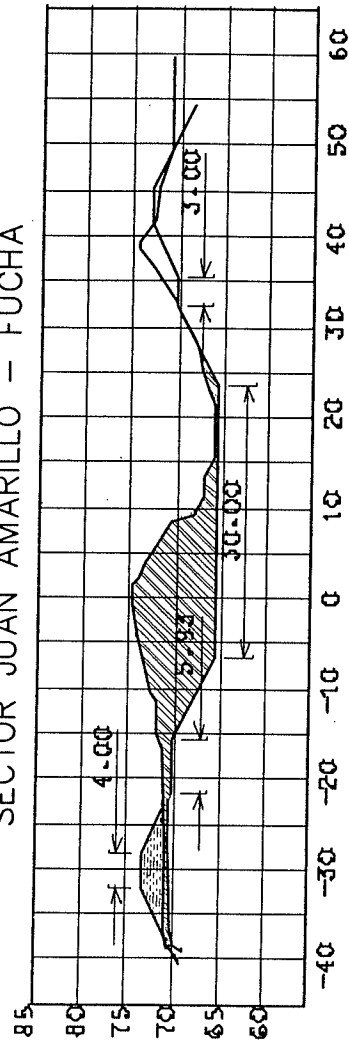
Appendix 5.2.1

Section to be Improved (Rio Bogota)

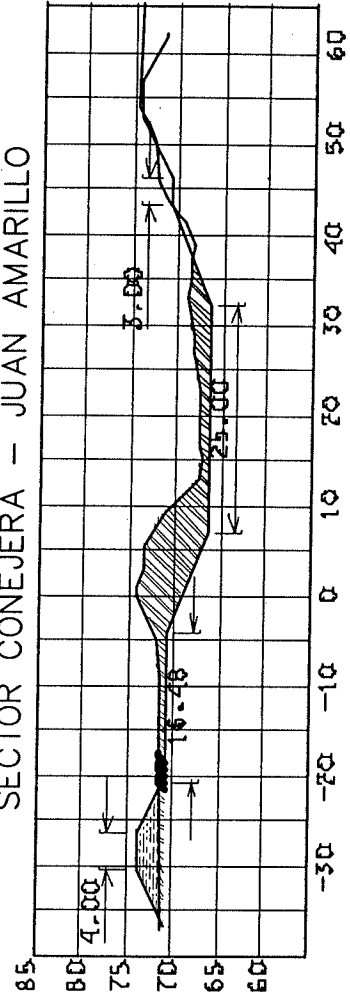
SECTOR FUCHA - TUNJUELO

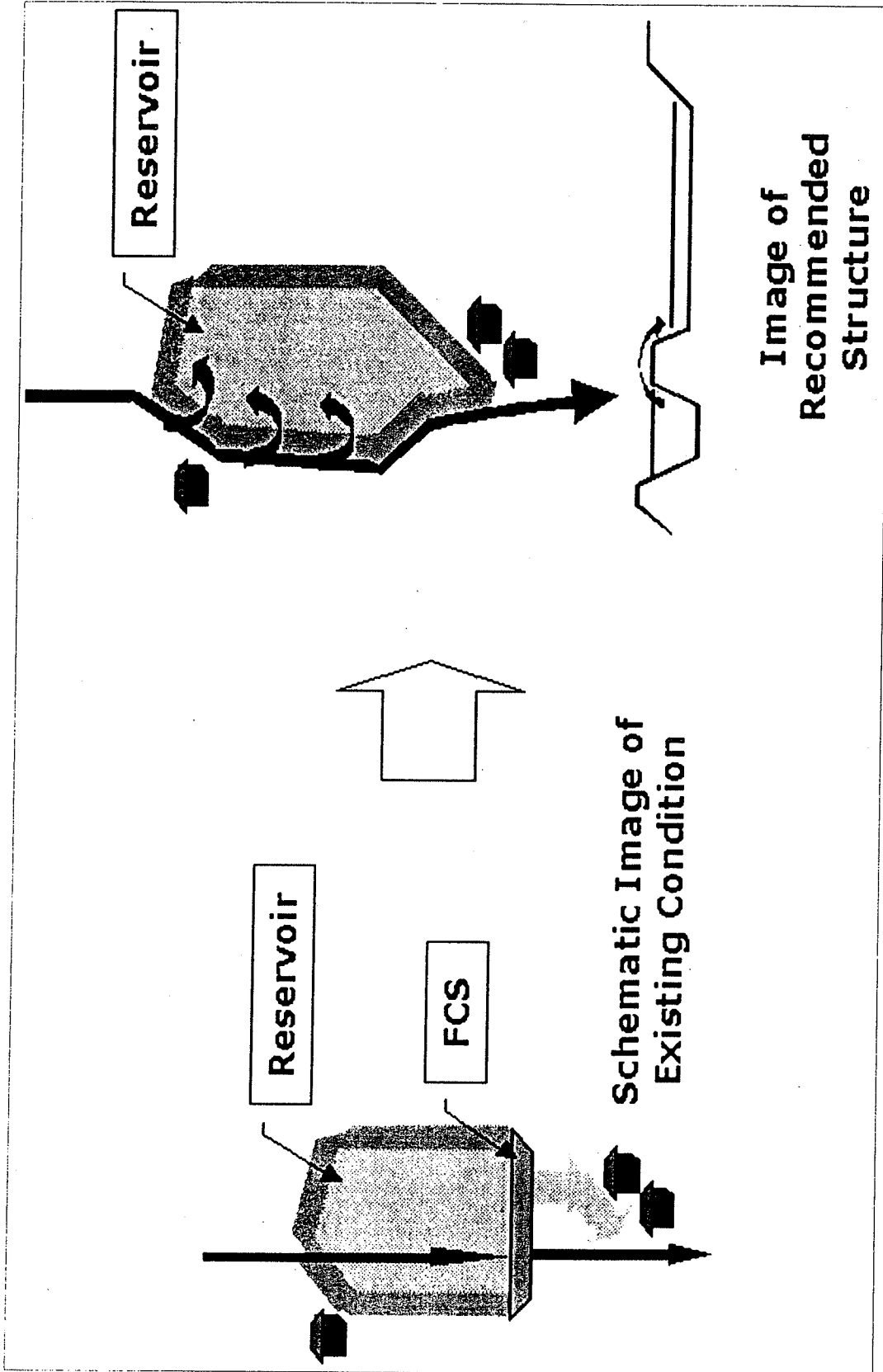


SECTOR JUAN AMARILLO - FUCHA



SECTOR CONEJERA - JUAN AMARILLO





Appendix 5.2.4 Integrated Risk Point for each UPZ

Localidad	UPZ No.	UPZ Name	Type No	Type	Ha	Population	Earthquake	Landslide	Flood	Chemical	
1. Usaquén	1	Paseo de los Libertadores	4	Development	659.72	35,185	5	4	5	5	
	9	Verbenal	1	Residential of incomplete urbanization	344.94	51,148	3	4	5	4	
	10	La Uribe	8	Endowment Predominant	338.44	8,461	3	4	5	4	
	11	San Cristobal Norte	1	Residential of incomplete urbanization	272.31	79,697	4	4	5	4	
	12	Toberin	6	Commercial	291.27	45,130	4	5	5	2	
	13	Los Cedros	3	Qualified residential	644.99	103,128	4	4	5	4	
	14	Usaquen	5	With Urban Centrality	440.71	30,275	4	4	5	4	
	15	Country Club	8	Endowment Predominant	285.03	20,562	4	5	5	4	
	16	Santa Barbara	5	With Urban Centrality	456.89	45,438	4	5	5	4	
	2. Chapinero	88	El Refugio	3	Qualified residential	297.59	31,681	4	3	5	4
		89	San Isidro - Patios	1	Residential of incomplete urbanization	113.02	8,311	4	4	5	5
		90	Pardo Rubio	2	Consolidated Residential	240.45	29,496	4	3	5	4
		97	Chico Lago	6	Commercial	422.39	34,184	4	5	5	4
		99	Chapinero	6	Commercial	161.26	21,677	4	4	5	4
	3. Santa Fe	91	Sagrado Corazon	6	Commercial	126.66	4,595	4	4	5	4
		92	La Macarena	2	Consolidated Residential	55.84	14,479	3	4	5	5
93		Las Nieves	6	Commercial	172.41	13,783	4	4	5	3	
95		Las Cruces	1	Residential of incomplete urbanization	98.48	24,628	2	5	5	4	
96		Lourdes	1	Residential of incomplete urbanization	231.63	59,166	3	4	5	5	
4. San Cristobal	32	San Blas	1	Residential of incomplete urbanization	352.19	95,685	3	4	5	5	
	33	Sosiego	2	Consolidated Residential	235.49	41,021	1	4	5	4	
	34	20 de Julio	1	Residential of incomplete urbanization	266.55	115,188	3	4	5	5	
	50	La Gloria	1	Residential of incomplete urbanization	385.88	113,591	1	4	5	5	
	51	Los Libertadores	1	Residential of incomplete urbanization	389.08	77,388	2	3	4	5	
5. Usme	52	La Flora	1	Residential of incomplete urbanization	206.88	16,523	2	4	5	5	
	56	Danubio	1	Residential of incomplete urbanization	268.11	23,095	1	3	5	5	
	57	Gran Yomasa	1	Residential of incomplete urbanization	530.24	118,444	2	3	4	4	
	58	Comuneros	1	Residential of incomplete urbanization	483.22	65,869	2	3	3	5	
	59	Alfonso Lopez	1	Residential of incomplete urbanization	233.54	19,955	2	4	5	5	
	60	Parque Entrenubes	8	Endowment Predominant	535.13	727	3	4	5	5	
	61	Ciudad Usme	4	Development	992.37	3,639	4	4	5	5	
6. Tunjuelito	42	Venezia	2	Consolidated Residential	642.89	130,731	2	5	4	4	
	62	Tunjuelito	1	Residential of incomplete urbanization	385.16	59,922	2	4	3	3	
7. Bosa	49	Apogeo	1	Residential of incomplete urbanization	496.6	34,116	3	5	5	4	
	84	Bosa Occidental	1	Residential of incomplete urbanization	717.45	166,262	2	5	2	4	
	85	Bosa Central	4	Development	402.24	144,621	2	5	3	4	
	86	El Porvenir	4	Development	564.86	32,507	3	5	2	5	
8. Kennedy	87	Tintal Sur	2	Consolidated Residential	210.43	2,753	4	5	2	5	
	44	Americas	5	With Urban Centrality	381	80,079	3	5	5	3	
	45	Carvajal	2	Consolidated Residential	435.62	137,700	3	5	5	3	
	46	Castilla	2	Consolidated Residential	500.22	103,163	3	5	4	4	
	47	Kennedy Central	2	Consolidated Residential	337.17	151,441	3	5	5	4	
	48	Timiza	2	Consolidated Residential	431.38	1,501,610	2	5	4	4	
	78	Tintal Norte	4	Development	345.16	76,587	5	5	3	4	
	79	Calandaima	4	Development	318.63	21,709	3	5	4	4	
	80	Corabastos	1	Residential of incomplete urbanization	187.51	21,502	2	5	3	4	
	81	Gran Britalia	1	Residential of incomplete urbanization	179.41	63,454	2	5	4	4	
	82	Patio Bonito	1	Residential of incomplete urbanization	314.21	102,709	2	5	3	4	
	83	Las Margaritas	8	Endowment Predominant	148.52	349	4	5	4	5	
	113	Bavaria	7	Industrial Predominant	277.72	17,755	3	5	5	3	
9. Fontibon	75	Fontibon	6	Commercial	496.45	138,722	4	5	3	4	
	76	Fontibon San Pablo	7	Industrial Predominant	359.97	26,838	4	5	2	4	
	77	Zona Franca	7	Industrial Predominant	490.22	22,632	5	5	2	4	
	110	Ciudad Salitre Occidental	3	Qualified residential	224.04	21,773	4	5	5	4	
	112	Granjas de Techo	7	Industrial Predominant	479.57	13,279	3	5	3	3	
	114	Modelia	3	Qualified residential	255.9	37,092	3	5	5	3	
	115	Capellania	7	Industrial Predominant	276.75	16,724	4	5	4	3	
	117	Aeropuerto El Dorado	8	Endowment Predominant	742.98	9,857	5	5	2	3	
	10. Engativa	26	Las Ferias	5	With Urban Centrality	474.06	127,252	3	5	5	4
29		El Minuto de Dios	2	Consolidated Residential	367.91	127,506	3	5	3	4	
30		Boyaca Real	2	Consolidated Residential	452.25	146,066	4	5	5	4	
31		Santa Cecilia	2	Consolidated Residential	308.28	77,537	4	5	5	3	
72		Bolivia	2	Consolidated Residential	449.34	93,949	3	5	2	5	
73		Garces Navas	2	Consolidated Residential	557.43	114,979	3	5	2	4	
74		Engativa	1	Residential of incomplete urbanization	588.2	56,373	3	5	2	4	
105		Jardin Botanico	8	Endowment Predominant	161.7	872	4	5	5	4	
116		Alamos	7	Industrial Predominant	197.13	6,227	4	5	4	3	
11. Suba		2	La Academia	4	Development	610.07	94	5	5	3	5
		3	Guaymaral	4	Development	1135.7		5	4	3	4
	17	San Jose de Bavaria	3	Qualified residential	439.68	41,581	4	4	5	4	
	18	Britalia	2	Consolidated Residential	328.41	40,886	3	4	5	4	
	19	El Prado	2	Consolidated Residential	428.95	72,549	3	5	5	4	
	20	La Alhambra	3	Qualified residential	284.28	37,693	4	5	4	4	
	23	Casa Blanca Suba	4	Development	419.92	30,159	2	4	5	4	
	24	Niza	3	Qualified residential	764.86	72,667	4	4	4	4	
	25	La Floresta	3	Qualified residential	389.94	28,504	4	4	4	4	
	27	Suba	1	Residential of incomplete urbanization	645.78	75,333	3	4	4	4	
	28	El Rincón	1	Residential of incomplete urbanization	720.33	211,681	3	4	3	4	
71	Tibabuyes	1	Residential of incomplete urbanization	745.78	95,108	3	5	1	5		

Localidad	UPZ No.	UPZ Name	Type No	Type	Ha	Population	Earthquake	Landslide	Flood	Chemical
12. Barrios Unidos	21	Los Andes	3	Qualified residential	275.01	35,409	4	5	5	4
	22	Doce de Octubre	2	Consolidated Residential	335.28	71,530	4	5	5	4
	98	Los Alcazares	2	Consolidated Residential	414.27	64,087	4	5	5	4
	103	Parque El Salitre	8	Endowment Predominant	164.96	2,109	5	5	5	5
13. Teusaquillo	100	Galerías	2	Consolidated Residential	237.92	33,685	4	5	5	3
	101	Teusaquillo	2	Consolidated Residential	237.54	29,162	4	5	5	4
	104	Parque Simon Bolívar - Can	8	Endowment Predominant	396.96	2,840	4	5	5	4
	106	La Esmeralda	3	Qualified residential	192.88	35,856	4	5	5	4
	107	Quinta Paredes	3	Qualified residential	175.25	24,316	4	5	5	1
	109	Ciudad Salitre Oriental	3	Qualified residential	180.48	233	4	5	5	4
14. Martires	37	Santa Isabel	2	Consolidated Residential	200.8	44,229	4	5	5	4
	102	La Sabana	6	Commercial	453.78	51,308	4	5	5	3
15. Antonio Nariño	35	Ciudad Jardín	2	Consolidated Residential	134.17	29,121	3	5	5	4
	38	Restrepo	5	With Urban Centrality	359.42	69,618	4	5	5	4
16. Puente Aranda	40	Ciudad Montes	2	Consolidated Residential	443.41	107,144	3	5	5	4
	41	Muzu	2	Consolidated Residential	249.42	73,270	4	5	5	4
	43	San Rafael	2	Consolidated Residential	327.45	91,990	3	5	5	4
	108	Zona Industrial	7	Industrial Predominant	344.82	5,585	4	5	5	1
	111	Puente Aranda	7	Industrial Predominant	359.39	11,845	4	5	5	1
17. La Candelaria	94	La Candelaria	8	Endowment Predominant	183.89	25,865	3	2	5	4
18. Rafael Uribe	36	San Jose	2	Consolidated Residential	208.35	53,543	3	4	5	4
	39	Quiroga	2	Consolidated Residential	381.78	117,589	3	5	5	4
	53	Marco Fidel Suarez	1	Residential of incomplete urbanization	179.24	77,335	3	4	5	4
	54	Marruecos	1	Residential of incomplete urbanization	358.6	70,650	2	3	4	4
	55	Diana Turbay	1	Residential of incomplete urbanization	182.12	70,228	1	4	4	4
	59	El Mochuelo	4	Development	321.14	884	3	4	4	5
19. Ciudad Bolívar	64	Monte Blanco	8	Endowment Predominant	790.49	6	4	4	3	5
	65	Arborizadora	2	Consolidated Residential	326.97	58,991	1	4	4	4
	66	San Francisco	1	Residential of incomplete urbanization	182.34	86,054	2	4	3	4
	67	Lucero	1	Residential of incomplete urbanization	581.61	228,212	3	4	3	4
	68	El Tesoro	1	Residential of incomplete urbanization	223.1	54,503	3	4	4	5
	69	Ismael Perdomo	1	Residential of incomplete urbanization	554.89	90,084	2	1	5	4
	70	Jerusalem	1	Residential of incomplete urbanization	350.08	64,994	3	4	5	5
	La Carela						4	5	2	5
	Chía						3	5	3	4
	Cota						3	5	5	4
Funza						4	5	5	4	
Facatativa						3	5	2	4	
Madrid						4	5	5	4	
Mosquera						4	5	4	4	
Soacha						3	5	4	5	

Appendix 5.3.1 Emergency Response Plan

1) Road and Bridge

There is no emergency response plan of roads and bridges for seismic disaster.

2) Water Supply Company

(1) General

EAAB is the only one company that has a contingency plan. The companies in eight municipalities do not have such plans. The contingency plan for the water supply/sewage system in each city municipality was not prepared by each public company. However, the above-mentioned EAAB contingency plan includes some part of the municipal area. Public company should prepare an individual contingency plan for the facilities. The followings are organization aspect, staff, information collection and distribution, emergency response measures, etc. of the present contingency plan by EAAB.

(2) Organization aspect

The Contingency Plan is related to the actions to be taken by EAAB in order to prevent and cope with emergencies that might be present on the main distribution network of potable water in Bogotá City, which consists of pipes with diameters between 16" and 78".

The Plan comprises a Strategic and Administrative Plan, an Operative Plan and Action Plan, a supplementary database, a chronological chart and an implementation budget.

According to the results of the vulnerability study on the main network, there have been established three emergency levels, which will have management strategies within the Contingency Plan and are described in the Operative Plan.

The three emergency levels are classified depending on the affected area, number of damages, control capacity, damages to the community, environmental deterioration and the requirement of external support. The classification is shown in Table 1.

Table 1 Classification of Emergency levels by EAAB

Level 1	Level 2	Level 3
Corresponds to emergencies that might appear due normal operation.	Corresponds to emergencies that might appear as a consequence of a low intensity earthquake or simultaneous failures on the network	Corresponds to the presence of medium to high intensity earthquake.
AFFECTED AREA: Certain . Area under rationing conditions in a period of time less than 72 hours. NUMBER OF DAMAGES: Damages controllable by EAAB CONTROL: EAAB Brigade PERSONAL INJURIES: None DAMAGES TO THE COMMUNITY: Not implied ENVIRONMENTAL DETERIORATION: Not implied EXTERNAL SUPPORT: Not required	AFFECTED AREA: Considerable. Under lingering rationing conditions, more than 72 hours. NUMBER OF DAMAGES: Simultaneous damages controllable by EAAB, with the contractors' support CONTROL: EAAB Brigade, Emergency Local Committee PERSONAL INJURIES: Lesser DAMAGES TO THE COMMUNITY: Infers on its daily activities EXTERNAL SUPPORT: Local Emergency Committee	AFFECTED AREA: Considerable without service rendering NUMBER OF DAMAGES: Simultaneous damages non-controllable by EAAB CONTROL: EAAB Brigade, Emergency Local Committee PERSONAL INJURIES: Severe injuries even death DAMAGES TO THE COMMUNITY: Severe, lack of service, alteration in local activities. EXTERNAL SUPPORT: National Emergency Committee, International help.

Source: Contingency Plan by EAAB, 2000.

In order to implement the contingency plan, first EAAB has established a permanent committee, which is in charge of evaluating and setting what are stipulated in the Plan, as well as to analyse different "levels of emergency" classified in this Plan.

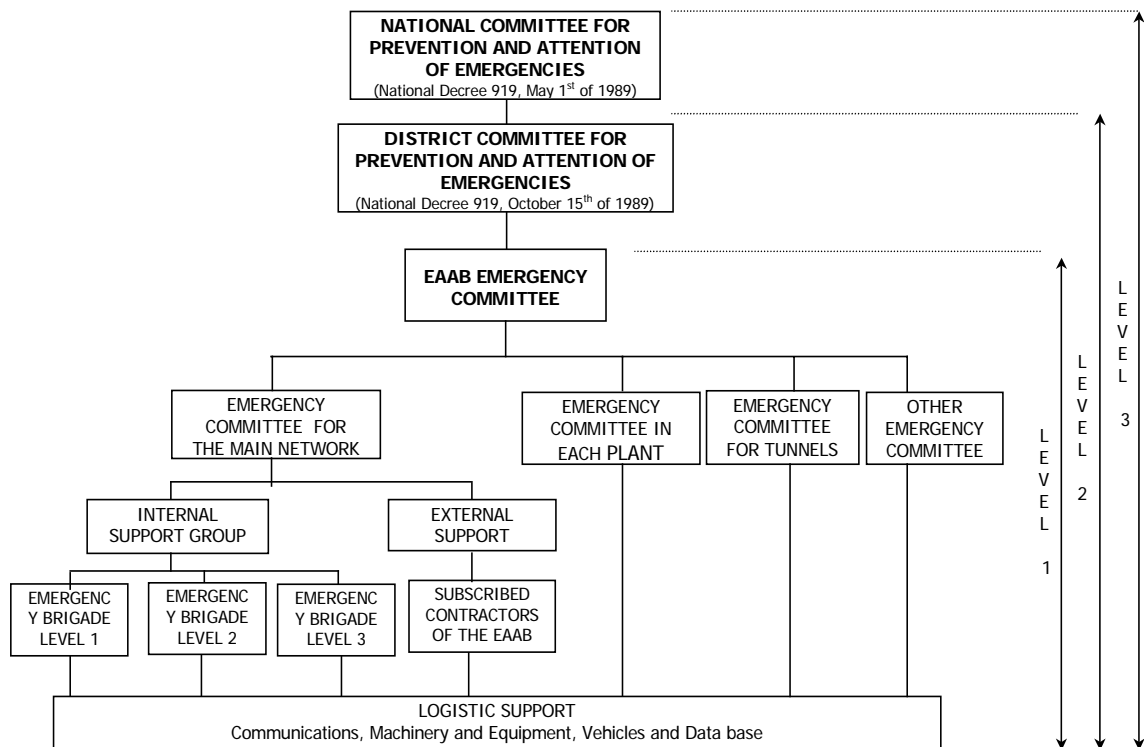
This committee will also lead the action of the contingency plan with the defined strategies for each level.

The Committee is formed by the representatives of some of EAAB directions and of the operation and maintenance group according to what is shown in the organizational chart below.

In order to define the follow-up actions in the event of a contingency, the emergency committee counts on the support of different groups, which are divided into Internal and External support groups.

The internal support group is in charge of setting up the procedures established as “responses” from EAAB, counting on the committee’s own logistics and the different brigades.

The External support group is in charge of coordinating the different needs to local or national external institutions. Figure 1 shows the administrative and organizational chart to manage an emergency situation.



Source: Contingency Plan by EAAB in 2000

Figure 1 Administrative and Organizational Chart to Manage Emergency

(3) Staff

In order to cope with emergencies related to network problems, at the present time there are three divisions located in three different strategic points of the city which are north, centre and south, where the information of daily damages in each area is obtained and integrated. Each zone has emergency brigades to attend the emergencies immediately. Additionally there exists the support of the Division of Civil work of EAAB.

There are not specific information about the number of technicians, engineers and/or workers available for reparation in each zone.

(4) Information collection and distribution

The division in charge to coordinate the operations in an emergency case will be the Operation and Maintenance division. With the collected information of damages the division must support the actions logistically, coordinate the works to be done, update the information of field works and integrate newly received information.

In respect to own communication medias in case of emergencies and for the normal function, EAAB has a radio system called Trunking that has a coverage in Bogotá City, as well as cellular phones for each one of the directives of the company.

Additionally there are radio telephones with own frequencies, telephones and beeper; the brigade of the Central of Operations has six radio telephones distributed in the coordinators in each floor to communicate with in any emergency. For Chingaza Dam system, there is a radio system in VHF that can be connected to the Trunking system.

(5) Repair goods

The tables 2, and 3 show the current equipment available from EAAB for each service area to utilize for emergencies. Information is not only on water supply system equipment but also on waste water system equipment.

Table 2 Distribution of equipment in the service areas in the capital district (Water Supply Network - Maintenance Management)

Equipments	Zones		
	North	Centre	South
	Quantity	Quantity	Quantity
Digger type Jonh Deere	0	1	0
Tipcart	2	2	2
Compressor	1	1	1
Disk lawn mower	1	1	1
Illumination Tower	1	1	2
Soldering Equipment	0	0	1
Electric Power Plant 2KVA (220V)	1	1	1
Vibro - Compactor	0	0	1
Plumbing Trucks	4	3	4
Light Truck type F-350	2	3	4
Unit of Power	0	0	0
Mixer of 11/2 Bto.	0	0	0
Backhoe	1	0	1
Compactor of Impact	1	0	0
Total No.	14	13	18

Source: Contingency Plan by EAAB, 2000

Table 3 **Distribution of equipment in the service areas in the capital district**
(Waste Water Network - Maintenance Management)

No.	Type of Equipment	Symbol	Total Existing Equipments	North Area	Centre Area	South Area
1	Suction-Pressure truck (VACTOR)	L	15	4	4	7
2	Pressure	EP	2	0	0	2
3	Rod	EV	9	2	3	4
4	Capstan	EC	12	4	3	5
5	Backhoe s/caterpillar	RE	5	1	2	2
6	Backhoe s/tire	RE	1	0	1	0
7	Digger s/Tire	RC	2	1	0	1
8	Loaders	F	5	2	1	2
9	Mini loaders	MC	5	2	2	1
10	Backhoe s/caterpillar, s/tire	F	5	1	2	2
11	Bulldozer	T	3	1	0	2
12	Trailer	R	5	2	1	2
13	Crane	E	1	0	1	0
14	Compressor	K	3	1	1	1
15	Pumping Engine 6"	BD	7	2	2	3
16	Pumping Engine 8"	BD	4	1	1	2
17	Pumping Engine 10"	BD	4	1	1	2
18	Sound	RS	7	2	2	3
19	Power unit	UP	4	1	1	2
20	Simple Tipcart	Q	7	3	1	3
21	D/simple cabin Tipcart	Q	8	2	3	3
22	D/cabin reconstruction Tipcart	Q	14	4	4	6
23	Tipcart with more capacity	Q	3	1	1	1
24	Level Machine	MN	1	0	1	0
Total No.			132	38	38	56

Source: Contingency Plan by EAAB, 2000

(6) Inspection

The plan does not specify the presence of inspectors to check the damages occurred in the network. However, the plan says that any person related with EAAB who identifies a rupture or damage in the network or any dangerous situation, has the obligation to report it to his immediate superior or directly to the Maintenance Division by radio or by telephone.

(7) Emergency Repair

Once an emergency is happened, the emergency committee will analyze the place or places where the emergency is located and the number and localization of valves to be closed in order to reduce leakages. Then the committee will send a group formed by the brigades (upon on each zone), to confirm the report of damages and to close the required valves. The brigade coordinator should inform to the emergency committee coordinator the intensity of the damage by radio.

After analyzing the kind of emergency and if it is classified as Level 1 or Level 2, the committee must determine if the company has enough capacity for coping with it or if it is necessary to contact some supporters like contractors.

If the emergency is classified as Level 3, the committee must contact the general manager that must inform and ask for support to the District Committee for Prevention and Attention of Emergencies, to the Local Committees or if necessary, to the National Committee for Prevention and Attention of disasters.

On the other hand, the emergency committee must analyze the emergency and establish which portion EAAB brigades repair and which other by contractors. Once the situation is understood, the committee must inform to the citizens about the damages, especially, the information related to reparation time. Following recommendations are given:

- Installation of pressure reduction equipment where necessary in order to reduce pressure towards supply stop area
- Preparation and maintenance of equipment and material for emergency use is recommended.

(8) Organization for disaster prevention

The criteria of personnel deployment are necessary to prepare and to inform it to the concerned people.

The methods where and how to go to the gathering place in an emergency are necessary to be known by the personnel to be deployed.

The roles of emergency action organization are recommended to be clear.

The manuals for actions of public relation are necessary to be prepared for such cases as in an usual operation, just in and after a disaster by earthquake and at supply stop.

3) Gas Natural Company

(1) General

The Contingency Plan is prepared by the Gas Natural gas company based on the vulnerability study on the main distribution network of gas pipes in Bogotá City which consists of steel pipes with diameters between 4" and 14".

The plan includes objectives, target emergency incident, categorization of emergency level, judgment of categorization, notification way, staff, information collection and distribution, emergency response measures, etc.

(2) Present emergency response plan

A. Objectives, target emergency incident and strategy

The plan is prepared in order to prevent and cope with emergencies that might be present on the main distribution network. The Objectives, target emergency incident and strategy of the plan is shown in Table 4.

Table 4 Objectives, Target, and Strategy of Contingency Plan by Gas Natural Company

Objectives	Target emergency incident	Strategy
a. Safeguard people and goods. b. Environmental preservation. c. Service maintenance and security pressures in the networks. d. Target for the public image.	a. Large amount of gas leakage into the atmosphere. b. Presence of gas in confined spaces. c. Gas leakage migrating toward confined spaces. d. Fire. e. Explosion. f. Over pressure g. Lack of Supply.	a. <u>Emergency actions</u> : a centralized manner from the Coordination of Emergency Attention Center (C.C.A.E). b. <u>Handling of a gas leak</u> : immediate isolation, securing zone/path of distribution net or affected facility. c. <u>Potential risk of the leak</u> : avoid total decompression of facility or of the involved net path. d. <u>Attention priority</u> : leak inside a house and in the high pressure net. e. <u>Presence of huge event</u> : handle along with the Emergency Local Committees, also if necessary, collaboration from other companies. f. <u>Preventive action</u> : carrying out the preventive/corrective maintenance along with the patrolling/operative continuous control of all Natural Gas Company facilities.

Source: Natural Gas Company, 2001

B. Categorization of emergency level

According to the results of the vulnerability study on the main network, the company has established three emergency levels, which will have management strategies within the Contingency Plan. The three emergency levels are classified such as very serious emergency, serious emergency and damage, depending on the affected area, number of damages, control capacity, damages to people, environmental deterioration and the requirement of external support. The categorization levels of emergencies are shown in Table 5.

Table 5 Categorization Level of Emergencies

Level 1. Very Serious Emergency		
Very Serious Emergency in Distribution and Transportation	Serious Accident a) If the accident affects people (death or serious injuries) or the facilities of Natural Gas Company or others with serious material damages. b) Accident situation that reaches a public repercussion in a way seriously altering the image of Natural Gas Company, even if the effect of the accident on people or properties is just slight or none at all. c) Seismic, avalanche and landslide events.	
	Serious Supply Problem a) If the accident affects the supply due to a defect or pressure excesses. b) If the accident affects the supply of a hospital, industry, customer, potential consumption of more than 4 million m ³ per year. c) Accident situation that affects the supply and reaches a public repercussion in a way seriously altering the image of Natural Gas Company, it does not affect the number of customers.	
	Very Serious Emergency in Reception a) Failure in the reception of natural gas, which comes from the transporters.	
	Level 2. Serious Emergency	
	Serious Emergency in Distribution	Minor Accident a) If the accident affects people (minor injuries) or properties of others with some slight damage. b) Great intensity leaks, without causing personal or material damages, without provoking a potential risk situation, and not reaching serious public repercussion. c) If a great amount of complaints are recorded due to an elevated level of gas odor in a reduced area. d) Situations that openly compromise the Company without any serious consequences to people and goods.
		Slight Supply Problem a) If the accident affects the supply due to a defect or pressure excesses; however, if the situation reaches a public repercussion considered as serious, then the incident could go up to the next level even if the number of customers does not reach the stipulated one.
		Level 3. Damage
Damage		a) Leak situation in which no one is injured and no public alert is given. b) If the accident affects the supply due to defect or pressure excesses .

Source: Contingency Plan by Natural Gas Company, 2001.

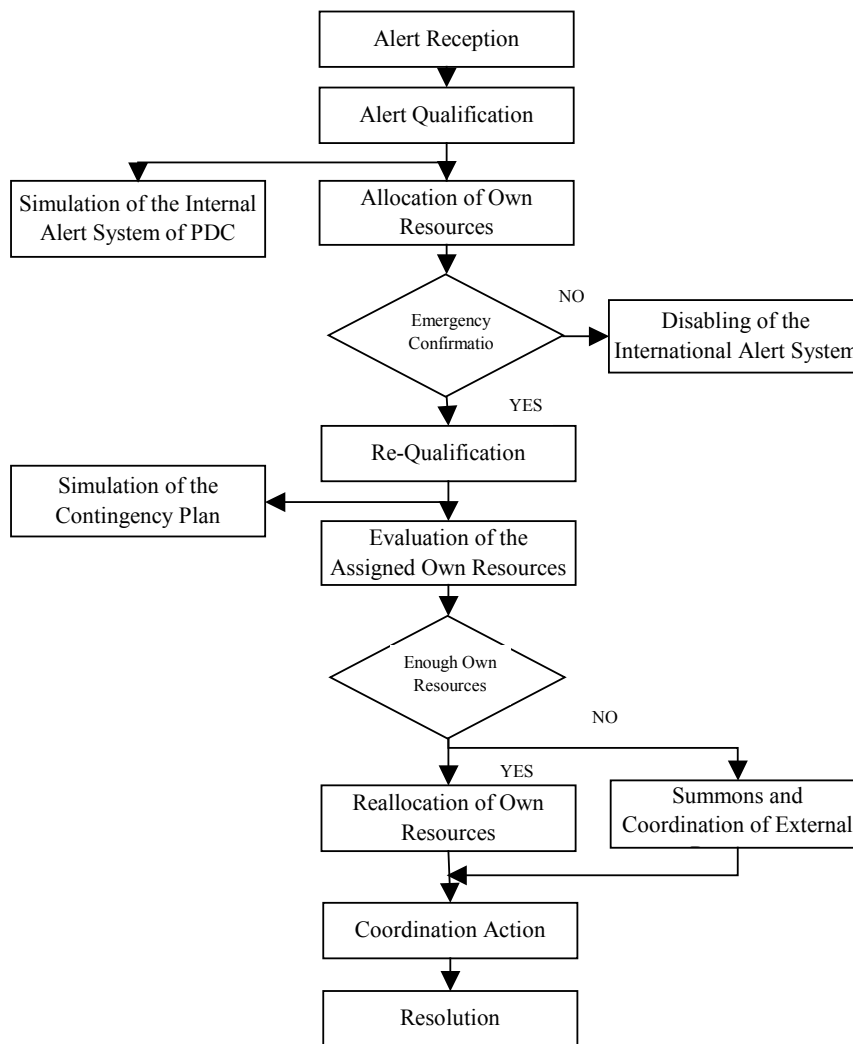
C. Emergency response chart

Emergency Attention Center (C.C.A.E in Spanish) is established first and emergency actions will be coordinated in a centralized manner from the Center.

If a huge incident is happened and exceeding the response capacity of Gas Natural, then it will be coordinated to be handled along with the Emergency Local Committees.

Also, if necessary, collaboration from the related companies that are storing, transporting and/or distributing hydrocarbon (or derived substances), will be required

Figure 2 is the flow chart showing the emergency response.



Source: Contingency Plan GAS NATURAL Company

Figure 2 Emergency response chart

D. Staff

There are two different kind of division systems for Bogotá City: The commercial one, which divides the city in three different sectors, and the technical one (to attend emergencies) which takes the city as a whole.

The attention of emergencies in Bogotá City is performed in two steps: The first one is carried out by gas Natural Company directly, that consists of reduction or elimination of the problem (make the area safe), and the second step that consists of reparation or re-construction of the damaged portion.

This second stage is performed by contractor companies under the contract of Gas Natural (private companies). For the attention of emergencies outside Bogotá, both steps are carried out by contractors. However there is not information available about staff in the two stage idea. Gas Natural says they can fix ten damages per day from the interview.

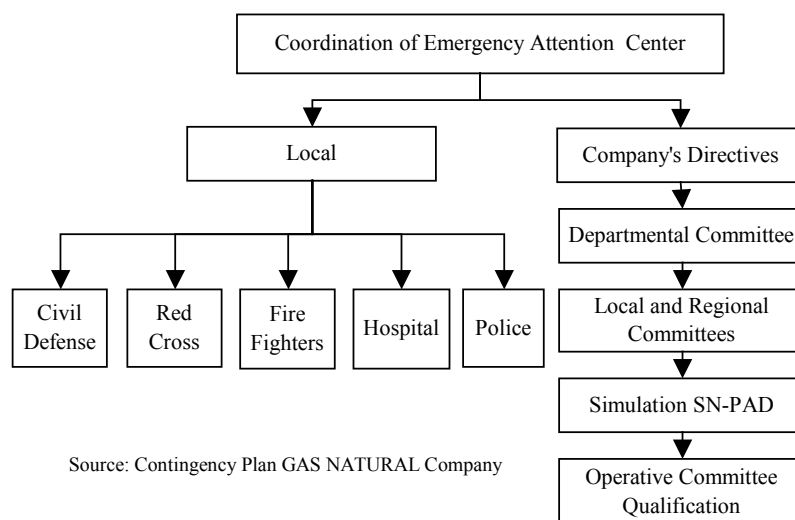
E. Information collection and distribution

In order to receive information of problems or emergencies in the Gas Natural network, the company has two different systems: the one is through the dispatch centre where some valves at the main network is monitored in real time by the measurement of gas volume, temperature, pressure, smell and calorific value.

The other information system is through the Urgency Center where phone calls from the users are received in aspects related to distribution and gas usage. All phone calls are introduced to a computer system to follow the progress of the emergency, and to categorize the level of problem. Leakage and gas smelling reports have priority over lack of gas.

In respect to communication medias, they use normal cellular phones (Bell South system) in an emergency case and there is a special transmission/radio at the main building in order to make contact with the fire department or the DPAE through a special frequency.

Figure 3 shows the flow how the notification is transmitted



Source: Contingency Plan GAS NATURAL Company

Figure 3 Flow of Notification Transmission

F. Emergency response measures

Repair Resources

For the emergency attention, Gas Natural, counts on the following resources:

- A Coordination of Emergency Attention Center (C.C.A.E.), which works 24 hours, everyday, year round. It's the place where the alerts are received, resources are assigned, actions are coordinated and also the communication with the public emergency institutions.
- Personnel to coordinate other companies or the public authorities with a telemetric measure of the operation parameters in order to attend the gas distribution problem
- Intervention equipment skilled for the immediate attention of emergencies. located on field in a strategic way in order to reach the place of an emergency in a shortest time possible.
- An announcement system to convoke the personnel, from the contract companies and from the public emergency institutions.
- Prevention and Attention of Disasters National System (SN-PAD in Spanish) through activating the notification chain, which proposes to involve the operator with the local emergency committees. The simulation of the Emergency Plan foresees the activation of the emergency structure of the company and SN-PAD at a local and regional level.
- Own communication system, between the intervention and maintenance teams with C.C.A.E.
- Own maintenance equipment and that from contract companies, with the necessary training in order to carry out every type of reparations in the utilization of facilities, auxiliary facilities as well as in the distribution network of high and mid pressure.

G. Inspection measures

No information available

H. Emergency measures

For immediate measures, the followings are taken:

- To assign resources for the solution, such as moving equipment and contracting the proper company, according to the emergency categorization.
- To take the first action for the resolution at the emergency field based on the coordination under C.C.A.E. and on the collected all the possible information in order to evaluate the magnitude of the emergency.
- To verify if the sources mobilized initially for the resolution are proper or not, by examining of the results of the first action.
- To coordinate all the actions to be taken in order to solve the emergency from the field and from C.C.A.E.

- To establish the initial communication with the authorities presented at the emergency field.
- To request the police intervention for the jurisdiction and/or the fire department to help solving the emergency and to assign medical assistance for the company's personnel or others affected by the accident.
- To keep informed the company's hierarchy of the emergency situation.
- In case of leakage, fire or gas explosion and if it is necessary to evacuate housings, public/private buildings, then the displacement and lodging orders will be given to the people affected by the emergency.
- To give alerts to the public authorities in case of serious or very serious emergencies that had been transmitted to the public mass media.
- To coordinate the authorities concerned and communication.

4) Disaster Prevention and Emergency Response Plan of Electrical Supply System

(1) Emergency Response Plan of EMGESA

A. Present disaster preparedness and emergency response plan

a) General

EMGESA has contingency plans, but only in the buildings and due to emergencies such as fire, floods or small earthquakes. These plans only consider aspects related with the evacuation of the personnel and their safety, but not plans related with the continuity of the electrical generation or how to prepare the potential damages.

b) Staff

The personnel in each generation plant is only the minimum necessary to administrate and make the normal maintenance procedures. The normal maintenance involves the mechanical and electrical matters, together with the checking of pipes.

c) Information Collection and Distribution

There is main control center where all the generation plants are monitored. Additionally, within each plant there is control center that monitors in real time variables such as pressure in the pipes and amount of energy generated, and is able to control the valves. Information about communication systems is not available.

d) Emergency response measures

Repair goods

If some serious problem occurs in a plant, like the damage of a turbine, the plants do not have the capability for repairing it in original state. It always needs to hire a special firm to perform this

kind of maintenance work, and sometimes the damaged elements should be transported to other city in order to be repaired.

A deep preventive maintenance is performed every year in each plant.

Emergency power generation

There is not a specific plan for the redundancy of the electric generation system. But usually all the plants owned by EMGESA are not operated at the same time.

The system of generation plants that uses water of Rio Bogotá is divided into two chains of generation called the old chain and the new one. Latter chain which is connected with Guavio plant is usually operated.

But the old chain is started when more power generation is required, even though its efficiency is very low compared to the new generation chain.

Recovery measures

There are not plans or rehabilitation measures. Furthermore, there are not plans for mutual help with other companies like CODENSA or EEB in emergency cases.

(2) Disaster Prevention and Emergency Response Plan of EEB

A. Present disaster preparedness and emergency response plan

a) General

The company has Environmental Management Plans for the transmission lines of 230 kV that conform to the Central and South corridors. The system is called Bogotá.

Within such studies, a contingency plan for each case was studied, but these plans are only available at the dependences of the company. The available information of these plans was limited.

b) Staff

EEB does not perform reparations directly, so the company does not have equipment or machinery. The preventive and corrective maintenance, and the emergency response are carried out by a contract with special companies.

These contractors are supervised directly by EEB and must fulfill the requisites given in the contract, the inspection manual and the company statute

c) Information Collection and Distribution

The company has the regional control center, which controls and supervise the assets owned by the company. The company supervises the infrastructure of transmission through the regional

control center that functions 24 hours per day all the year. When an event or emergency in the system occurs, the engineer in charge performs the procedures and warns the maintenance coordinators.

d) Emergency response measures

Repair goods

There is not information available in respect to repair goods. As mentioned before, EEB does not perform any kind of reparation works directly. This kind of work is all done by contractors.

Inspection and emergency repair

There is a little information as follows:

- The reparation of a tower could take 30 days, while repairing a broken wire takes 12 hours.
- The company participates actively in the Committee for Electrical System Security, which is integrated for all the Energy companies in Cundinamarca and Meta.

(3) Disaster Prevention and Emergency Response Plan of CODENSA

A. Present disaster preparedness and emergency response plan

a) General

CODENSA has prepared the contingency plan which is related to the actions taken by CODENSA in order to prevent and respond to emergencies that might be present on the main distribution network of electricity in Bogotá City and the whole country as well.

b) Summary of contingency plan

A summary of the objective, scope of the actions that the personnel might perform and the covered events by the contingency plan are shown in Table 6. The covered disasters are mainly seven (7) disasters such as fire, seismic movement, collapsed structure, explosion and etc., and several scope of personnel intervention is mentioned.

Table 6 Summary of Contingency Plan by CODENSA

Objective	Covered Disasters	Scope of Personnel Intervention
a. To have a coordinated group of human resources, physical, technicians, administrative and financial resources to assist quickly and efficiently events that threaten the stability and permanency of the company, the community or the environment	a. Fire in administrative areas and offices b. Fire in substations c. Seismic Movements d. People trapped in collapsed structures e. Attack with explosive f. Bomb threat g. Holdup, kidnapping or forced taking	a. To act according to the procedures settled down in the Plan b. To use the protection and control means for emergencies, available in the headquarters. c. All intervention in the event of emergency should have support on external rescue squads. d. Never act if your life or personal integrity is put in danger. e. The actions that occupants of the headquarters would perform, will be at the level of first answer and control of incipient events. f. All event whose magnitude overcomes the present personnel's capacities in the headquarters, or the capacity of the control equipment available for emergencies, should be commended to external rescue squads.

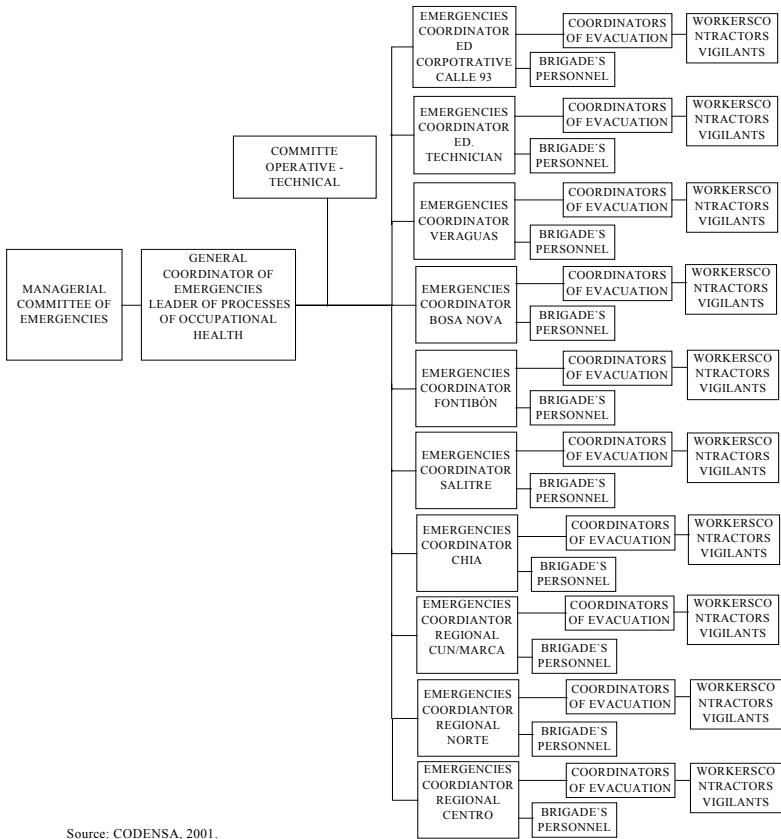
Source: CODENSA, 2001.

c) Organization

The organizational structure for emergencies is shown in Figure 4 and the sequence of internal response in emergency case is shown in Figure 5.

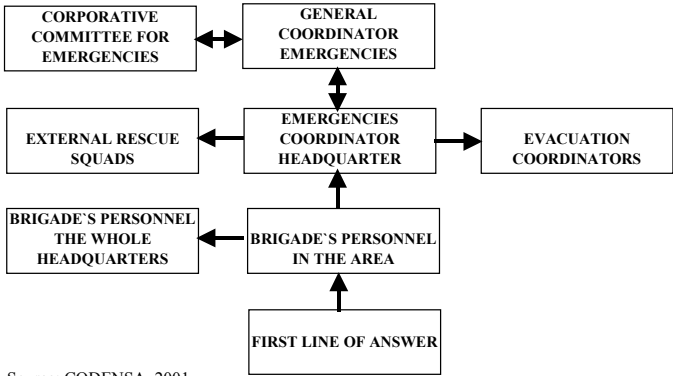
General coordinator of emergencies manage and control of emergency situation through 10 head quarters.

The brigade personnel collects information and give it through emergency coordinator to general coordinator for analysis and decision.



Source: CODENSA, 2001.

Figure 4 Organizational Structure for Emergencies



Source: CODENSA, 2001.

Figure 5 Sequence of Internal Response in Emergency

d) Staff, information collection and distribution

Even though the Study Team has not received much information about CODENSA, it is known that the maintenance, control and reparations are performed by personnel of the company, but as in a similar case of EAAB, because the size of the network, CODENSA hires external contractors to carry out some work.

e) Emergency response measures

The contingency plan has executed the vulnerability analysis of the headquarters, and is performing the organizational structure, brigades, training and simulation. Besides, the plan is advancing in the following implementation plans.

- Specific Procedures;
- Inventories of external resources;
- Improvement of protection level in substations, and
- External performance plans.

5) Telecommunication System

(1) General

There are six institutions, ETB, CAPITEL, EPM. Bogotá, TEELECOM, COMCEL, BELLSOUTH with regard to telephone communication system in Bogotá metropolitan area.

ETB have 37 local control centers and 4,500 cabinets in Bogotá City. While CAPITEL have 10 local control centers and 98 radio bases.

There is no information available for the disaster preparedness plan and emergency response plan of telephone communication system except a little information.

Only a little information is from ETB. ETB are performing vulnerability study to 37 local control center buildings and the Study of 15 buildings is already finished as of May 2001. Reinforcement of 8 buildings are under reinforcement and will be completed in 2001.

(2) Emergency Response Plan

A. General

As above mentioned, there is no information available for present disaster preparedness and emergency response plan, only requisite recommendation is made for preparation of those plans.

Appendix 5.3.2 Matrix for Organization

Table 1 Organizations and Responsibilities in Emergency Responses (Bogota D.C.)

	Transportation	Communication	Public works and Engineering	Fire-fighting	Information and Planning	Mass care	Resources Support	Health and Medical Services	Urban Search and Rescue	Hazardous Materials	Food	Energy
Mayor	S	S	S	S	S	S	S	S	S	S	S	S
Government Secretary						S					S	
DAPD			S		S		S					
Health Secretary						S		P	S	S		
Treasury Secretary							S					
DAMA			S		S					S		
DPAE-FOPAE	S	S	S	S	P	S	P	S	S	S	S	S
Firemen Official Body				P					P	P		
Civil Defense	S			S		S		S	S	S	S	
Red Cross						S		S	S	S	S	
Metropolitan Police	S	S		S	S			S	S	S	S	
Military Unit	S	S	S	S		S		S	S			
District Administrative of Social Welfare						P	S				P	
Transit Police	S	S		S	S				S			
EAAB ESP			S	S	S	S						
IDU	S		P									
EEB CODENSA			S			S						P
ETB TELECOM		P										
Department of Community Action		S			S	S		S	S		S	
Local Mayors	S	S	S	S	S	S	S	S	S	S	S	S
Secretary of Traffic and Transport	P											
Concejo Colombino de Segridad (CCS)										S		
Metro Vivienda			S						S			
TRANSMILENIO	S											
Natural Gas E.S.P										S		

Note: Primary Agency: Responsible for coordination of the emergency support function

Support Agency: Responsible for supporting the primary agency

Source: JICA Study Team, Bogota City Government

Table 2 Preparedness and Responsible Agencies for Disaster Prevention (Bogota D.C.)

	Government Buildings	Transportation facilities	Hospital buildings	Medical Arrangement	Hazard Materials	Communication System	Public Education	Lifeline facilities	Prepare for Emergency Res.	Parks	Landslide	Flood Control Facilities	House Buildings
Mayor	S	S	S	S	S	S	S	S	S	S	S	S	S
Government Secretary	S	S			S	S	S	S	P				
DAPD	S	S	S			S	S	P	S	S	S	S	S
Health Secretary	S		P	P	S	S	S		S				
Treasury Secretary	S	S	S										
DAMA					P				S				
DPAE-FOPAE	S	S	S	S	S	P	S	S	S	S	P	S	S
Firemen Official Body					S	S	S		S				
Civil Defense						S	S		S				
Red Cross			S	S		S	S		S				
Metropolitan Police					S	S							
Military Unit					S								
District Administrative of Social Welfare							S						
Transit Police						S			S				
EAAB ESP								S	S			P	
IDU	P	P	S					S	S				
EEB								S	S				
CODENSA								S	S				
ETB						S		S	S				
TELECOM								S	S				
Department of Community Action													
ECOPETROL					S			S					
Secretary of Education							P						
Metro Vivienda													P
Local Mayors	S	S	S	S	S	S	S	S	S	S	S	S	S
District Institute of Recreation and Sports									S	P			

Note: Primary Agency Responsible for coordination of the emergency support function

Support Agency Responsible for supporting the primary agency

Source: JICA Study Team, Bogota City Government

Table 3 Organizations and Responsibilities in Emergency Responses in Cundinamarca

	Transportation	Communication	Public works and Engineering	Firefighting	Information and Planning	Mass Care	Resources Support	Health and Medical	Search and Rescue	Hazardous Materials	Food	Energy
Governor	S	S	S	S	S	S	S	S	S	S	S	S
General Secretaey	S	S	S	S	S	S	S	S	S	S	S	S
Military Brigade	S	S	S		S	S	S	S	S		S	
National Police	S	S	S		S		S	S	S		S	
Firemen Office		S		P	S	S	S		S	P		
Secretary of Health	S	S		S	S		S	P	S	S		
CAR			S	S	S	S				S		
Civil Defense	S	S		S	S	S	S	S	P	S	S	
Red Cross	S	S		S	S	S	S	S	S	S	S	
Secretary of Planning			S		S		S					
Government Secretary OPAD	P	P	S	S	P	S	P	S	S	S	P	S
Secretary of Agriculture and Rural Development			S		S		S				S	
Secretary of Treasury			S		S		S					
Secretary of Public Works			P		S	S	S					P
Secretary of Environment				S	S					S		
Secretary of Social Development					S	P	S					
Traffic and Transportation Administration Department	S				S					S		
Human Talent Administrative Department					S							
Eight Municipalities	S	S	S	S	S	S	S	S	S	S	S	S
Empresa Energ					S							S
Empresa Electrica CODENSA		S			S							S
Sec. Prensa		S										
TELECOM		S										
Comunidad	S	S	S	S	S	S	S	S	S	S	S	S
Concejo Colombiano de Segridad (CCS)										S		

Note: Primary Agency: Responsible for coordination of emergency support function

Support Agency: Responsible for supporting the primary agency

Source: JICA Study Team, Cundinamarca Government

Table 4 Preparedness and Responsible Agencies for Disaster Prevention in Cundinamarca

	Government Buildings	Transportation facilities	Hospital buildings	Medical Arrangement	Hazard Materials	Communication System	Public Education	Lifeline facilities	Prepare for Emergency Res.	Parks	Landslide	Flood Control Facilities	House Buildings
Governor	S	S	S	S	S	S	S	S	S	S	S	S	S
General Secretary		P											
Military Brigade						S	S		S				
National Police						S	S		S				
Firemen official Body					P	S	S		S				
Secretary of Health			P	P		S	S		S				
CAR					S		S						
Civil defense						S	S		S				
Red Cross						S	S		S				
Secretary of Planning	S		S				S	S	S		S	S	
Government Secretary OPAD	P	S	P	S	S	P	S	S	P	S	S	S	S
Secretary of Agriculture and Rural development									S			S	
Secretary of Treasury	S	S	S			S	S	S					
Secretary of Public Works	S		S			S		S	S		P	S	S
Secretary of Environment					S		S		S				
Secretary of Education							P						
Secretary of Social Development							S		S				
Institute of Vivienda									S				S
Traffic and Transportation administration		S							S				
CUNDEPORTE										S			
Eight Municipalities	S	S	S	S	S	S	S	S	S	P	P	P	P

Note: Primary Agency: Responsible for coordination of the emergency support function

Support Agency: Responsible for supporting the primary agency

Source: JICA Study Team, Cundinamarca Government

Table 5 Organizations and Responsibilities in Emergency Responses (National)

	Transportation	Communication	Public works and Engineering	Fire-fighting	Information and Planning	Mass care	Resources Support	Health and Medical Services	Urban Search and Rescue	Hazardous Materials	Food	Energy
President office	S	S	S	S	S	S	S	S	S	S	S	S
Ministry of Interior				S	S		S					
Ministry of Finance and Public Credit							S					
Ministry of National Defense		S										
Ministry of Health		S			S	S		P	S	S	S	
Ministry of Communication		P			S							
Ministry of Transportation	P								S	S		
Ministry of Environment			S	S						S		
National Department of Planning					S		S					
Colombian Civil Defense	S			S		S		S	P	S	S	
Colombian Red Cross		S		S		S		S	S	S	S	
Colombian Chamber of Construction			S									
Colombian Society of Construction Engineer			S									
DGPAD	S	S	P	S	P	S	P	S	S	P	S	S
National Institute of Roads (INVIAS)	S		S									
Military Forces (FF,MM)	S	S	S	S		S		S	S			
Colombian Telecommunication's Enterprise (TELECOM)		S										
Ministry of Education					S	S						
National Institute of Familiar Comfort(ICBF)						P		S			P	
National System of Fire Fighters		s		P					S	S		
Ministry of Agriculture,						S					S	
Ministry of Energy			S							S		P
Ministry of Development			S							S		S
Consejo Colombiano de Seguridad (CCS))										S		

Note: Primary Agency: Responsible for coordination of the emergency support function

Support Agency: Responsible for supporting the primary agency

Source: JICA Study Team, DGPAD

Table 6 Preparedness and Responsible Agencies for Disaster Prevention (National Level)

	Government Buildings	Transportation Facilities	Hospital Building	Medical Arrangement	Hazard Materials	Communication System	Public Education	Lifeline Facilities	Prepare for Emergency Res.	Investigation
President Office	S	S	S	S	S	S	S	S	S	
Ministry of Interior	S					S			S	
Ministry of Finance and Public credit	S		S						S	
Ministry of National Defense	S					S			S	
Ministry of Health	S		P	P		S	S		S	
Ministry of Communication	S					P	S	S	S	
Ministry of Transportation	S	P				S		S	S	
Ministry of Environment	S					S	S		S	S
National Department of Planning	S	S	S			S		S	s	S
Colombian Civil Defense						S	S		P	
Colombian Red Cross Society			s	S		S	S		S	
Colombian Chamber of Construction	S									
Society of Construction Engineer	S							S		
DGPAD	P	S	S	S	S	S	S	S	S	P
National Police									S	
National Institute of Roads (INVIAS)						S		S	S	
Military Force (FF.MM)						S			S	
Colombian Telecommunication's Enterprise (TELECOM)						S		S		
Ministry of Education	S						P			S
National Institute of Familiar Comfort (ICBF)	S								S	
National System of Fire Fighters						S			S	
Ministry of Agriculture	S									
Ministry of Energy	S							S	S	S
Ministry of Development	S							P	S	S
National University										S

Note: Primary Agency: Responsible for coordination of the emergency support function

Support Agency: Responsible for supporting the primary agency

Source: JICA Study Team, DGPAD