

SECTION 4

WATER SERVICE DISRUPTION DUE TO THE 1985 MICHOACAN EARTHQUAKE

In this section, the water service disruption and its impact on the population of metropolitan area are discussed. The main causes for the disruption are identified. Repair methods and techniques used by government officials to supply water during the recovery period are also described.

Conservative estimates are that the earthquake left 3 to 3.5 million people without water in the Federal District while 1.8 million people were without water in the State of Mexico. That is, approximately 30% of the estimated 18 million people in Metropolitan Mexico City were without water immediately after the earthquake. The lack of water for this large portion of the population was caused by extensive damage to the buried transmission and distribution lines in Metropolitan Mexico City. There was some minor damage to wells, but reservoirs, storage facilities, and purification plants were essentially unaffected by this earthquake. The success of government officials in implementing an emergency response plan, which had never previously been into practice, is noteworthy.

4.1 Federal District

Prior to the 1985 event, aqueducts in the southeastern portion of the city provided a flow of about $7.6 \text{ m}^3/\text{sec}$ to the Federal District distribution network. The Michoacan earthquake severely damaged these aqueducts. This resulted in temporary suspension of the $7.6 \text{ m}^3/\text{sec}$ flow to the distribution network. The distribution network itself also experienced numerous earthquake induced leaks that resulted in a lack of water in some areas of the city. In addition, non-earthquake damage to the distribution system occurred when people broke open valve boxes to extract water which remained in the system.

The implementation of the Federal District water system emergency response plan was delayed because the central headquarters building was completely destroyed by the earthquake. As a result, organization of emergency supply and repair activities was very difficult. Nevertheless the response of government officials was extremely fast, considering the circumstances, with

the damage assessment of the system starting within a few hours after the occurrence of the earthquake.

As soon as the areas without water were identified, limited distribution using water tank trucks, as shown in figure 4-1, and portable tanks provided by the U.S. Government was started. Furthermore the Federal Government provided an extra $1.73 \text{ m}^3/\text{sec}$ to the Federal District network to compensate for the supply shortage. Initially repair activities concentrated on the damaged aqueducts and on the main lines in the distribution system. As of October 2, 1985 (ie, about 2 weeks after the earthquake) the outage in the Federal District is as shown in figure 4-2. The 'colonias' (neighborhoods) without water were those listed in table 4-1. By the end of October the aqueduct supply had been restored to about $7.1 \text{ m}^3/\text{sec}$ so that the water supply to the distribution network was essentially the same as before the earthquake. Repairs in the distribution network lasted a few months.

4.2 State of Mexico

In the State of Mexico, a major transmission pipeline supplying about $1.6 \text{ m}^3/\text{sec}$ was severely damaged. This particular pipeline is discussed in more detail in Section 7. The flow supplied by this pipeline represented 70% of the total in Ciudad Nezahualcoyotl, the other 30% being supplied by wells connected to the distribution network. As in the Federal District, damage to the distribution network was also extensive. State of Mexico officials initiated the emergency plan immediately after the earthquake. The system was restored to its pre-earthquake condition by November 4. As in the Federal District, repair covered earthquake induced damage as well as numerous valve boxes which were broken by desperate users. During the recovery period, water was distributed using tank trucks, portable tanks and sealed plastic bags with purified water, as shown in figure 4.3

4.3 Repair Techniques

The priority order for earthquake repairs (i.e., which leaks were repaired first) was based upon a combination of engineering and political judgment. That is, some leaks were temporarily left unrepaired since they were able to provide reduced water service to downstream portions of the system.

FEDERAL DISTRICT

BENITO JUAREZ	IZTAPALAPA	VENUSTIANO CARRANZA
NARVARTE	COLONIAL IZTAPALAPA	IGNACIO ZARAGOZA
ALAMOS	ZONA URBANA EJIDAL	U. GOMEZ FARIAS
XOCHIMILCO	U.H. VICENTE GUERRERO	JARDIN BALBUENA
	JUAN ESCUTIA	FEDERAL EMILIO CARRANZA
	TEPALCATES	MERCEDEZ BALBUENA
STA. CRUZ ACALPIXCA	U.H. LA VALENCIANA	MAZA ROMERO RUBIO
U. VILLA XOCHIMILCO	EJIDOS DEL MORAL	U.H. KENNEDY
SAN GREGORIO	U.H. GUELATAO DE JUAREZ	U. GOMEZ
TLAHUAC	LA PENIA STA. CRUZ	SEVILLA
	SIFON STA. CRUZ MEYEHUALCO	PENSADOR MEXICANO
	LOMAS DE ZARAGOZA	FELIPE PESCADOR
SELENE	SAN ANDRES TETEPILCO	ALVARO ORREGON
STA. CECILIA	STA. MA. AZTAHUACAN	LORENZO BOTURINI
AMPL. SELENE	PROGRESISTAS	MAGDALENA MIXUCA
STA. CATARINA	U.H. MARGARITA MAZA DE JUAREZ	
SAN JOSE	VOCEADORES	GUSTAVO A. MADERO
DEL MAR	FRANCISCO VILLA	
TLALTENCO		Sections 4th, 5th and 6th
SUR TLALTENCO	IZTACALCO	SAN JUAN DE ARAGON
OJO DE AGUA		VILLA DE ARAGON
TRIANGULO	VIADUCTO PIEDAD	S.T.M. SAN JUAN DE ARAGON
CUAUHTEMOC	PANTITLAN	SAN PEDRO EL CHICO
	MARTE	CAMPESTRE ARAGON
CENTRO	SAN PEDRO IZTAPALAPA	U. HABITACIONAL LA JOYA
ALGARIN	GRANJAS MEXICO	NUEVA ATZACOALCO
ASTURIAS	REFORMA IZTACCIHUATL	7 DE NOVIEMBRE
MORELOS	AGRICOLA ORIENTAL	PUEBLO DE SAN JUAN DE
DOCTORES	JUVENTINO ROSAS	MALINCHE
ROMA NORTE Y SUR	RAMOS MILLAN	SAN BARTOLO ATEPEHUACAN
OBREIRA	LOS REYES	
PAULINO NAVARRO	SANTA ANITA.	
LAGUNILLA		

STATE OF MEXICO

CIUDAD NEZAHUALCOYOTL (all 'colonias')

MUNICIPIO DE ECATEPEC

Table 4-I 'Colonias' in Metropolitan Mexico City Without Water Supply as of October 2, 1985.



FIGURE 4-4 Steel Saddle On Damaged Pipe