June 1985

State and community during the aftermath of Mexico City's November 19, 1984 Gas Explosion

Kirsten Johnson

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Natural Hazards Research
and Applications
Information Center

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INTRODUCTION*

On November 19, 1984, Mexico experienced the worst industrial disaster of its history when a liquid petroleum gas (LPG) plant was totally destroyed in a series of explosions resulting in over 500 deaths, approximately 2,500 injuries, as well as the virtual destruction of a seven block area of a working-class neighborhood adjacent to the facility.

Within hours it became clear to most people that the explosions had originated in the storage plant itself, a facility owned and operated by PEMEX, the national oil corporation. Although official confirmation of PEMEX's responsibility did not come for a number of weeks, the corporation came under considerable pressure when pointed queries were made concerning its safety record and its judgment in locating the plant in a populated urban area. Growing public criticism and alarm put the government and PEMEX, its most powerful parastatal, on the defensive. As soon as the urgent logistical problems of rescue and emergency assistance had been resolved, the government's attention turned to limiting the political damage resulting from the event.

It became imperative for the government to respond in a timely and effective manner to the disaster. In the days and weeks following the explosion, its multiple agencies, organizations, and departments assumed most of the major, and several of the minor, roles in the recovery effort. In all respects the State set the agenda for recovery and monopolized the decisions

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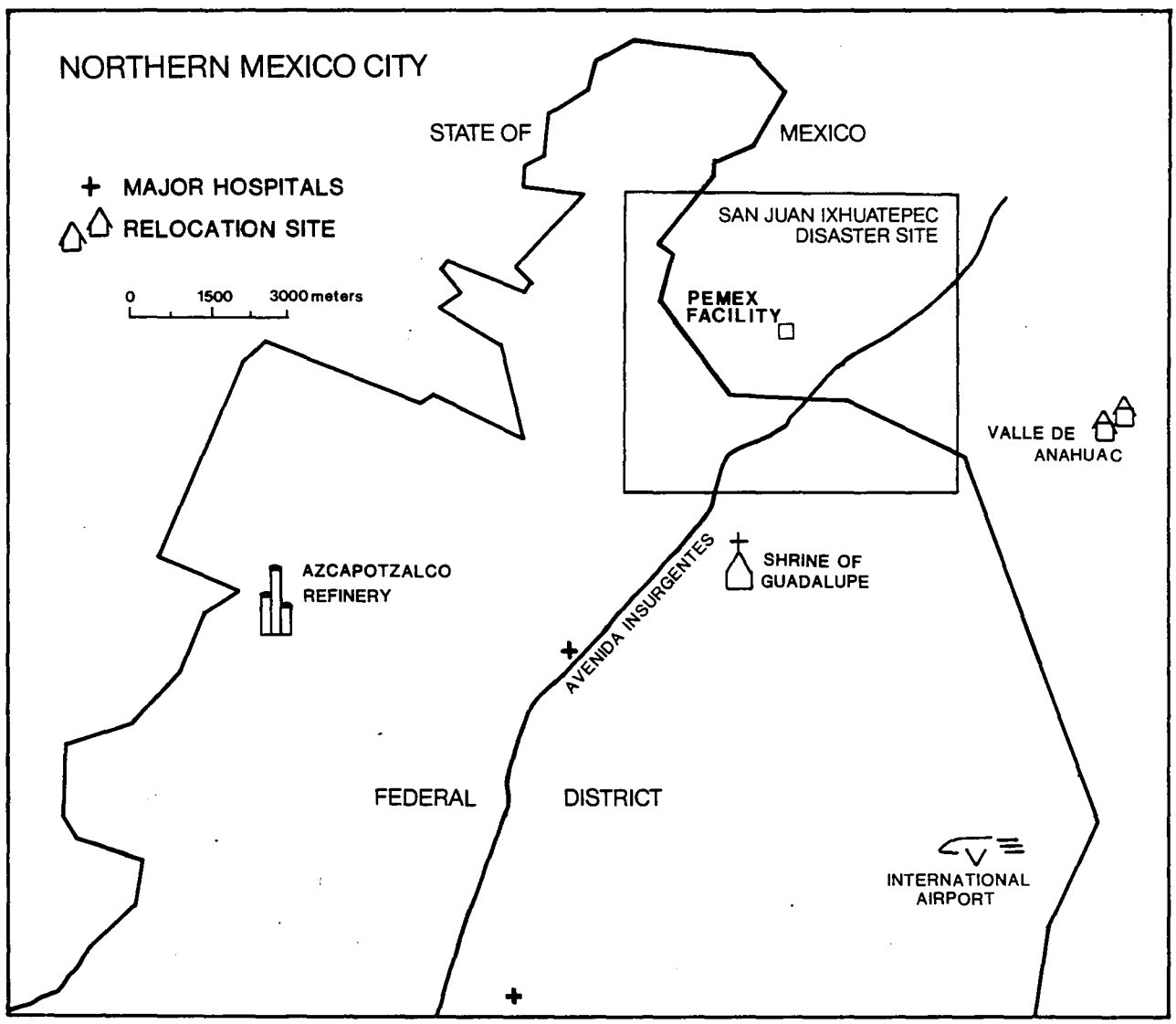
shaping the pace and form of reconstruction. Despite the overwhelming government presence, the survivors were by no means passive actors in the recovery process. Community-based groups articulated their needs and organized assemblies and demonstrations in an attempt to influence the terms of the recovery agenda.

This paper provides an account and preliminary assessment of the early stages of recovery from the San Juan Ixhuatepec gas explosion disaster. Special attention is paid to the activities and decisions taken during the two months following the explosion. This period encompasses the principal decisions and events, including major changes in land use, affecting the long-term reconstruction process. In addition, it provides insights into the strengths and weaknesses of a particular style of disaster management which can best be termed authoritarian-paternalistic.

The first section of the paper offers a short description of the geographic setting and historical evolution of the disaster site. San Juan Ixhuatepec is located in the State of Mexico in an area due north of the Federal District. San Juan Ixhautepec is part of the northern zone of metropolitan Mexico City which has experienced dramatic industrial expansion and population growth over the past two decades (see Map 1). However, unlike Bhopal where squatter settlements grew up in the immediate vicinity of the Union Carbide plant after the latter was established, the village of San Juan Ixhuatepec predates PEMEX and the industrial expansion of Mexico City by several centuries. Its complex history of occupance and the resulting conflicting claims over land use, access, and ownership are an important element in the differential vulnerability to risk experienced by sectors of its population, as well as a factor influencing the ultimate pattern of post-disaster

Map 1

Northern Mexico City and the San Juan Ixhuatepec Disaster Site



reconstruction.

Following a brief account of events on the day of the explosion, the second section of the paper describes the activities, decisions, and conflicts during the aftermath of the disaster. Special emphasis is given to the role of the State as the principal decision maker during this period. However, other aspects, in particular the general public's overwhelming response to the event, and the event's significance in popular and political culture are also noted.

The final section of the paper discusses the issues raised by Mexico's experience with disaster recovery. Some of these issues concern questions, such as the relation between state power and urban working-class neighborhood organizations, that are fairly specific to Mexico's current social and political circumstances. Other issues, such as the actual level, timing, and efficacy of disaster and recovery planning, lend themselves to a comparison of the Mexican case with other instances of disaster recovery. The bases for a systematic comparison are provided by the 1977 Haas et al. study[1] of reconstruction after the Managua earthquake, and are discussed in a preliminary manner in this paper. Finally, perhaps the most significant issues raised by Mexico's gas disaster concern the urban ecology of risk generated by extraordinary rates of urban growth, rapid industrial development, and weak zoning and regulatory controls. These are conditions Mexico City shares with Bhopal and dozens of other urban centers in developing countries. Models of hazardous facility siting and technological risk assessments designed for the industrialized world may be largely irrelevant to situations such as those now prevailing in metropolitan Mexico City.

THE SETTING

San Juan Ixhautepec, better known as San Juanico, is an ancient settlement located on the northern edge of what is now metropolitan Mexico City. Its history dates back at least to Aztec times when Ixhuatepec was known as the place of green maize leaves.[2] The hamlet occupied flat lands adjacent to the banks of a river in a narrow valley surrounded on three sides by steep hills. Beyond these hills to the south were the lakes and the island city of Tenochtitlan.

During colonial times Ixhuatepec acquired the second part of its name when Juan Diego, the humble Indian peasant who experienced a vision of the nation's patron saint, the Virgin of Guadalupe, came to live in the community for a period of time. A church housing an antique painting commemorating the first baptism of Indians in San Juanico by Spanish missionaries was built during the eighteenth century.[3] As time passed, community lands were annexed to an hacienda in the northern half of the valley. Following this, a rail line connecting Mexico City to the coast traversed the valley marking a boundary between San Juan Ixhuatepec's peasants and the hacienda estate.

The years following the Mexican revolution brought prosperity to the village which rapidly grew to become a thriving agricultural community linked to Mexico City's produce markets. In time, however, the city's labor demands transformed this agricultural settlement into a labor reserve peri-urban community. This was an important step in San Juanico's final absorption into metropolitan Mexico City.

New settlements grew up around the original village site. As migrants arrived from the countryside, shanty towns with names like San Juan Lomas and La Presa crept up the steep hillslopes, and a string of "irregular" dwellings

were established along the rail line within meters of the tracks. Most recently a middle-class residential development and golf course were built on land formerly owned by the hacienda. Over the past 30 years the population of the original San Juan Ixhautepec grew from a few thousand to over 30,000 inhabitants, while that of the overall valley and hillslopes skyrocketed to roughly 300,000. This growth reflects that of Mexico City as a whole wherein dozens of agricultural villages located on the urban fringe being transformed into urban residential and industrial zones within a matter of a decade or less.[4]

In the case of San Juan Ixhuatepec, an important element in this process was PEMEX's 1961 decision to locate an LPG storage and distribution facility on federal lands across the railroad tracks from San Juanico. When completed, the facility covered 30 acres and included two large spherical tanks, four medium size upright cylindrical, and 48 smaller horizontal cylindrical containers 12 meters long and 2.5 meters in diameter with a total capacity of 80,000 barrels of LPG. The facility became an important node in the network linking production sites on the Gulf Coast with urban users, ultimately providing 40% of the metropolitan area's gas supplies.

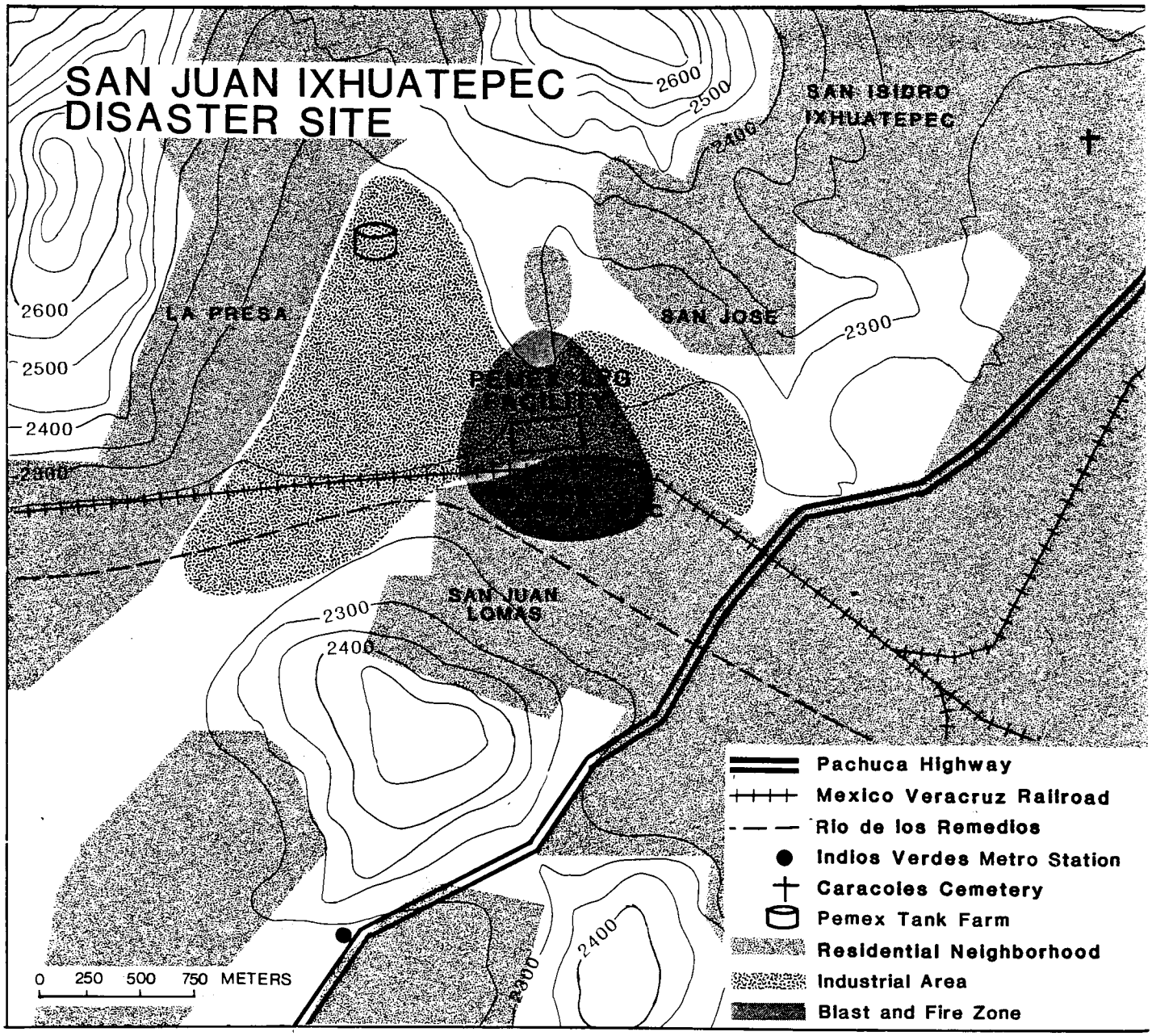
The PEMEX facility led to a very rapid industrial and residential development of San Juan Ixhuatepec in the years following 1961. Seven private gas distributors established themselves in the immediate vicinity of the storage site on land acquired from the former hacienda. By 1984, over 40 industries (including petrochemical firms, a paint factory, a paper mill, a foundry, a glass factory, and a saw mill) were located in the valley floor. To these PEMEX recently added an oil storage facility in the northwest section of the valley.

As the valley became populated by an increasing number of industries and as thousands of newcomers squatted on hillslope settlements lacking running water and sanitation, environmental conditions in San Juanico deteriorated rapidly. The once clean Remedios River is now an open canal carrying raw sewage and industrial wastes, and its steep banks are strewn with refuse and feces. Factories pour tons of pollutants into the atmosphere. Heavy traffic from the nearby highway generates emissions dangerously contaminating San Juanico's air with carbon monoxide, ozone, sulfur dioxide, lead, nitrous oxide, and dust. The community now lives under an almost perpetual blanket of smog.[5] These airborne hazards are compounded by risks underground. San Juanico's subsoil is crisscrossed by a network of gas pipe lines, many of which are decades old and in poor repair.[6]

The result of rapid expansion has been a complex land use pattern featuring a mix of residual agricultural land and former hacienda structures held by private estate owners, along with a middle-class low-density residential area partially buffered by topography from the high density working-class neighborhoods situated in close proximity to a concentration of industrial firms handling a variety of hazardous materials (see Map 2). While the industries are located on the prime lands of the valley floor, the working-class neighborhoods occupy more varied types of lands: the long-term consolidated settlement of San Juan Ixhuatepec bounded on the north by the railroad track and on the south by the Remedios River; boundary areas occupied by squatters along the railroad track immediately adjacent to PEMEX and some of the private gas distributors; newer settlements occupying the hillslopes. The quality of housing in San Juanico reflects the varied incomes, security of tenure, and levels of consolidation achieved by successive waves of immigrants. The

Map 2

San Juan Ixhuatepec Disaster Site



center of the community is characterized by one and two story masonry structures, interior patios, and metal grillwork on doors and windows. Hillslope houses are mostly one or two room dwellings of adobe of cement block with corrugated metal roofs. Dwellings located along the railroad tracks are made mostly of impermanent, flimsy materials.

A CHRONOLOGY OF EVENTS ON NOVEMBER 19, 1984

At 5:40 on the morning of Monday, November 19, 1984 San Juan Ixhuatepec and its surroundings were awakened by the sound of a massive explosion. In seconds a giant fireball engulfed large portions of the community sending its residents fleeing from their homes to seek refuge on the nearby highway and hills. The first explosion was followed by a succession of lesser and greater blasts that burned hundreds of people exposed on the streets as they attempted to escape from their collapsing dwellings. The explosions also propelled large metal shards into the surrounding neighborhood, landing on houses up to 1.5 kilometers away.[7] In all, 54 steel tanks holding millions of liters of liquid butane and propane gas exploded and went up in flames in a conflagration that took firemen 14 hours to bring under control.[8]

Half an hour after the first explosion, Mexico's Defense Minister ordered an emergency plan, the DN-III-E to be put into effect (see Figure 1). By that time soldiers and federal road patrols had already arrived in San Juan Ixhuatepec. Ambulances, firemen, and reporters were on their way to the scene from all parts of the Federal District as well as from the states of Mexico and Hidalgo. The police closed the major highway traversing the area while soldiers assisted in the evacuation of the panic-stricken population.

Figure 1

The San Juan Ixhuatepec Gas Explosion: A Chronology of Events[9]

5:40	First explosion
5:42	San Juan Ixhuatepec engulfed by fireballs Residents flee to road and hills to South and West
5:45	First alarm received at a Federal District firestation
5:50	Second explosion
6:00	Federal police close Mexico-Pachuca highway First detachment of soldiers arrives
6:10	Defense Secretary declares emergency DN-III-E plan in effect
6:14	Another explosion, neighborhood engulfed by flames again Reporters and photographers arrive on scene Police, firemen, and ambulances arrive
6:17	Hundreds of wounded and others start arriving on foot and by car at the Indios Verdes Metro station
6:47	Lesser explosions Army starts to evaculate area PEMEX shuts off 4 gas pipelines to facility
6:59	Large explosion keeps firemen at a distance
7:00	Disaster announced on television, comparisons with Hiroshima and Nagasaki lead to general panic in northern areas of the city
7:00-11:00 AM	Series of lesser explosions
7:30	Crowds block major access roads to disaster site
8:00	Church bells chime continuously Firemen contain flames within a 2 km. radius Soldiers cordon off large area
9:00	First injured treated at hospitals
9:30	State Governor arrives at site
9:50	Northern zone of city cut off 600 factories close Electricity, water, and telephones shut off
10:00	Tens of thousands of refugees begin to arrive at national shrine of the Virgin of Guadalupe
11:50	Fire chief declares situation under control PEMEX officials warn of possible further explosions
14:00	200,000 to 250,000 people have fled or have been evacuated
15:30	Firemen contain fire to storage facility where gas continues to burn
20:00	Fire extinguished

At the outset, the fire, explosions, and number of casualties overwhelmed the rescue efforts. As explosions continued, firemen were unable to get near enough to bring the flames under control. As tens of thousands of people fled to the highway, ambulances were unable to get through to pick up the wounded who were emerging from the disaster area. During the first hour residents had to rescue one another. By 6:15 hundreds of people, among whom were many of the wounded, had made their way to a nearby Metro station and, with the help of commuters on their way to work, arrived at nearby medical centers by public transportation. Others made their way to the national shrine of Guadalupe where by 10:00 in the morning thousands of refugees began to congregate.

By 8:00 a.m. firemen managed to contain the conflagration within a two kilometer radius, and the army, after cordonning off a large zone, began to evacuate those who had not already fled. By noon the northern zone of the city was cut off, its factories closed, and its apprehensive inhabitants were left without electricity and other services. By mid afternoon the fire was limited to the storage facility, and approximately 250,000 people had been evacuated. City hospitals had admitted over 4,000 injured people, and rescue teams continued to collect the bodies of what, by official accounts, were to be 500 casualties from the rubble of San Juan Ixhuatepec.[10] In all, over 2,000 houses were damaged and 150 were completely destroyed by the explosions, fire, and metal shards from the tanks. By nightfall the first phase of the emergency was over.

THE AFTERMATH

In the two months following November 19, the people of San Juanico tried to recover from their personal and material losses and rebuild their lives.

During this period PEMEX was forced to acknowledge its responsibility for the disaster, and government officials from a variety of agencies and ministries addressed the multiple demands and tasks of community relief and reconstruction. In addition, the media and the public at large raised pointed questions about PEMEX's culpability and, on a broader level, issues regarding the vulnerability of Mexico City's population to the new risks implicit in its rapid industrial growth.

It was during these critical, self-questioning times that authorities made major decisions regarding victims' rights to compensation as well as choices resulting in significant land use changes in San Juan Ixhuatepec. Although most, if not all, of these decisions were made in a paternalistic, top-down fashion, government officials were by no means immune to public pressure. The image of responsiveness became as important to the State as its actual ability to respond to the crisis effectively. In a short time, the political management of the disaster and its consequences overshadowed the technical and logistical tasks.

The unfolding of these decisions and activities during the early recovery period reveals a great deal about the manner in which the Mexican State manages the aftermath of a large-scale, politically sensitive disaster. Moreover, in the case of San Juan Ixhuatepec, the disaster aftermath provides an example of the effects of authoritarian disaster management upon an urban working class community attempting to recover from a calamity.

The following pages detail the events and activities occurring during this critical period. Using as an organizing framework a model developed by Haas and others to describe and compare sequential stages of recovery from disaster, I will argue that the Mexican case, while bearing important similar-

ities to the general pattern common to other disaster recoveries, also exhibits important differences. In large measure, these differences stem from the highly charged political overtones of a disaster laid at the doorstep of the country's most important parastatal.

The model developed by Haas and others in their study of recovery in Managua and other cities posits four stages of disaster recovery activity: (1) the emergency period, during which all of the community's normal social and economic activities cease; (2) the restoration period, in which the physical and service functions are restored at a rudimentary level; (3) the first reconstruction period, in which major infrastructure and urban functions are fully recovered; and (4) the second reconstruction period, characterized by major improvements, developments, and commemorative structures (Haas et al., 1977, pp. xxvi-xxviii). The authors argue that although these activities overlap to a degree, they are largely sequential, each phase lasting approximately ten times as long as the preceding one. Their empirical studies demonstrate that the rate of post-disaster recovery is influenced by factors such as the magnitude of the damage, the resources available for recovery, pre-disaster trends, and the planning and organizational capacities of those responsible for reconstruction (Haas, et al., 1977, pp. 12). Using this model it is possible, as its authors have done, to compare different instances of disaster recovery of different magnitudes in diverse settings.

A review of the events unfolding during the weeks following the November 19 gas explosion reveals a sequence of activities and indicators similar to those set forth in the general model. However, important differences in the timing and pattern of the recovery stages make the Mexican experience diverge from both the general model and other historical cases. These differences

concern, most importantly, the accelerated rate of recovery, which, lasting a little over ten weeks, was much shorter than might have been predicted by the algorithm of the model. Moreover, in what is perhaps a unique aspect of this case, the last phase of recovery, Reconstruction II, involving activities associated with civic improvement, commemorative developments, and the like, overlapped with other phases of recovery, having a decisive impact upon them.

An important factor in the pace and pattern of the recovery effort was the prompt implementation of official measures decreed by the Governor of the State of Mexico when he arrived at the scene of the disaster four hours after the explosión. These measures concerned five major spheres of activity (relief assistance, material and economic support, establishment of a communications and information system, prevention of future catastrophes, and determination of responsibilities) to be executed within a specified time frame: (1) immediate action (the first 15 days); (2) short term action (16 to 90 days after the disaster); and (3) medium term action (90 days to one year after the disaster).[11] The manner in which these measures were implemented, as well as the response they evoked among those whom they affected, are described in the pages to follow. For analytic purposes the account is organized according to the general stage model of disaster recovery discussed above. However, it should be noted that in many respects the first three stages of the model are quite similar to those of the actual assistance and recovery plan implemented by the state of Mexico. Figure 2 provides a useful diagram of the four stages along with a number of relevant indicators discussed in the text.

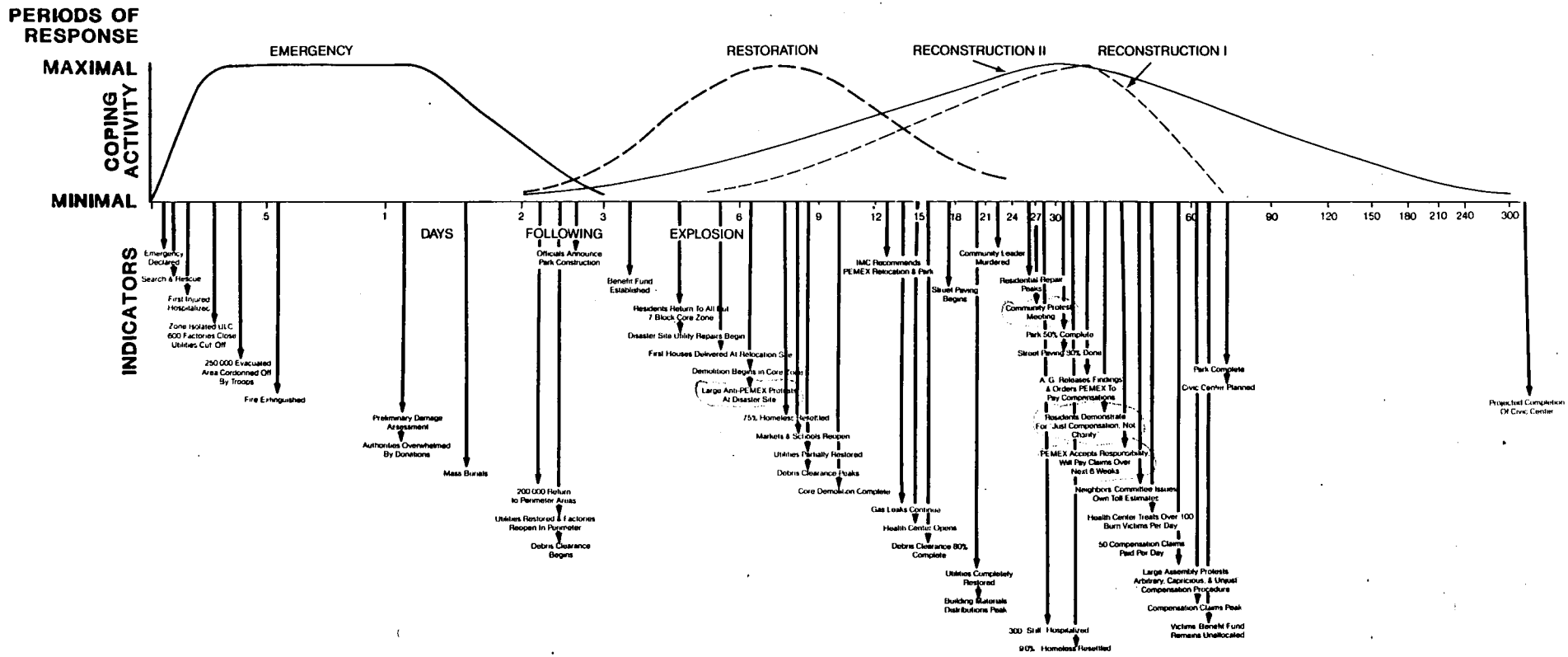


Figure 2

San Juan Ixhuatepec: Recovery Stages from the November 19, 1984 PEMEX Gas Disaster

Emergency (November 19 - November 21)

The emergency period lasted approximately three days and was experienced in varying degrees of length and severity by different sectors of the population in the larger San Juan Ixhuatepec valley area. On the morning of the day following the explosion, a zone of about 8 square kilometers remained cordonned off by troops, and roughly 250,000 of its inhabitants were housed in temporary shelters. Almost 2,500 people were being treated for wounds in hospitals, while relatives of those who had died were attempting to identify remains and prepare for their burial in a mass grave. The death toll continued to mount as the most severely injured died in hospitals and as rescue workers recovered more bodies from the rubble. Over 14 hectares of San Juanico which before the explosion had housed approximately 3,000 people were destroyed, and an additional 15 hectares of dwellings were seriously damaged. In addition to its impact on San Juanico, the effects of the disaster were felt over a large area of northern metropolitan Mexico City where utilities had been cut off and over 600 factories had shut down, idling thousands of workers.

Significantly, this day coincided with a major national holiday marking the anniversary of Mexico's revolution. November 20 is characteristically the occasion when PRI, the country's ruling party, celebrates the accomplishments of the revolution during its long tenure in office. As hours passed, it became increasingly clear that the responsibility for the disaster probably resided with PEMEX. This fact cast a shadow on the celebration, as the regime, ever sensitive to the ideological implications of events, was put on the defensive. The President, after a somber speech at the ceremony, flew over San Juanico in a helicopter and ordered an assessment of the damage.

By this time, Humberto Lira Mora, the Attorney General of the State of Mexico, whom the Governor had put in charge of coordinating assistance to the disaster victims, had set up headquarters in the nearby city hall of Ecatepec. From there, teams of doctors, coroners, and lawyers carried out the priority task of counting and identifying casualties, and issuing death certificates prior to burial. In addition, engineers and public works personnel began a preliminary assessment of damage to community structures and utilities and thereby demarcated three impact zones: most affected (a seven block core zone), partially affected (a large portion of old San Juan Ixhuatepec), and least affected (the largely undamaged perimeter). This classification would serve as the basis for organizing the evacuees' phased return to the area, and subsequently as a guide for post-disaster land use planning (State of Mexico, 1985, pp. 7-9).

By the third day after the explosion, authorities had allowed all people living in the least affected areas to return to their homes. Workmen were busy restoring utilities and many factories had resumed operations. The population in the shelters decreased dramatically. Official agencies which had been overwhelmed by private donations of food and clothing issued a plea to the general public to stop sending assistance in kind and, instead, to make contributions to a victims' benefit fund.

As things were beginning to return to normal in the perimeter area, the main part of San Juanico remained cordonned off and its population scattered in shelters, hospitals, or among relatives and friends. While the emergency had ended for most of those who had been evacuated, it continued for about 30,000 of the most affected population. It was not until the fifth day that residents of all but the seven block devastated zone were allowed to return to their homes.

Restoration (November 22 - December 9, 1984)

Within two days of the disaster high government officials decided not to rebuild the seven block 'most affected' area destroyed by the explosion and fire. It was decided that in its place there would be a park. This decision, having a major impact on the area's land use as well as upon the lives of those who lived there, was to shape the course of the entire recovery process.

At the outset, the community believed that the park would be built on PEMEX property at the site of the explosion itself. However, when bulldozers began to demolish the remaining structures in the core zone, San Juanico's residents awoke to the fact that what had been termed a 'commemorative park' would be carved out of their own community. By the time, ten days later, that an officially constituted Interministerial Commission made the formal announcement that the PEMEX facility would be relocated and a park would be built, major steps had already been taken to put this land use change into effect, and the adversarial course of State-community relations had been set.

The restoration period itself commenced five days after the explosion when large quantities of building materials provided by the state of Mexico were delivered to San Juanico. Even as the rescue teams discovered new bodies in the ruins, municipal workers began to clear debris from the streets and reconnect utilities in the damaged areas. In the days that followed, teams of sanitation workers fumigated houses, and notaries public officially certified the return of homes to surviving families. While the core zone remained cordonned off and guarded by troops, other parts of the community returned to life. Food, clothing, and building materials were distributed to residents, some stores resumed business, and nine days after the explosion, the central

market and schools reopened.

The construction of a park displaced over 180 families who had survived the explosion in the core zone. On the fifth day following the explosion, officials announced that all these families would be provided with housing in Valle de Anahuac, a newly constructed working-class development located ten kilometers to the east of San Juanico (see Map 1). The first families were settled on the following day. The location and miniscule size of the houses (approximately 270 square feet) gave rise to protests from families who often had to crowd up to ten members into these two room dwellings far from their friends and familiar community.

The restoration period lasted approximately two and a half weeks. By December 9, three weeks after the explosion, 90% of the homeless had been housed. In the affected areas of San Juanico debris clearance was complete, most building materials had been distributed, utilities and services had been restored, and an extensive apparatus for administering relief assistance was in place.

It is important to note that the government had adhered to its own emergency relief plan timetable. Within 15 days of the explosion, "most of the population had returned home or been given new houses, and basic services and civil activities were normalized" (State of Mexico, 1985, pp. 11).

At the same time, the death toll kept mounting as burn victims continued to die in hospitals. By official accounts over 300 people, about one-third of whom were in critical condition, were still hospitalized at this time. The hastily established health center in San Juanico was attending over 200 outpatients a day. Its director reported that while supplies were plentiful, many patients needed specialized treatment for both physical and emotional

traumas.[12] The latter were magnified during this period by a series of gas leaks from underground pipes which continued for at least two weeks after the explosion.

Reconstruction I (November 24, 1984 - January 30, 1985)

The reconstruction phase of the San Juan Ixhuatepec gas explosion stands out among other instances of disaster recovery because of the speed with which it was accomplished and the expeditious manner in which the procedure and mechanisms for compensating its victims were devised and executed. Given the length of the prior restoration phase (18 days), Reconstruction I could have been expected to take approximately 180 days to complete. In fact, this phase actually took only 63 days, a little over one-third that time.

The reconstruction of San Juan Ixhuatepec involved decisions and activities in three areas: (1) physical reestablishment of private housing damaged by fire or metal shards in San Juanico itself, and provision of permanent housing for the homeless at the relocation site of Valle de Anahuac; (2) reestablishment of a minimum sense of community security; and (3) assuring the well-being of housholds with members who had been killed or injured.

Repairs by homeowners began shortly after authorities set up a system for delivering building materials provided by the government of the State of Mexico. Three weeks after the explosion these distributions peaked and by Christmas the major part of the damage to residential structures in the community had been repaired.

By this time all but a few of the homeless 180 families had been settled at Valle de Anahuac. As days went by and the reality of the park became certain in most minds, it became clear that these dwellings were to be a perma-

nent relocation solution for those displaced by government orders. While this solution was adequate for those whose San Juanico dwellings had been small, makeshift, and lacking in utilities, and for others who did not care ever to return to the scene of the disaster, it was strongly opposed by those who had possessed better, and in particular, larger houses in San Juanico. Many of the latter were old-time ejidatarios whose families had lived in the community for generations and whose relatively large properties allowed them to keep farm animals such as chickens, pigs, and even cows. For many of the old-timers the loss of their homes was compounded by the loss of their community.[13]

The second element of Reconstruction I was the reestablishment of a sense of community security. Virtually all of San Juanico's residents wanted PEMEX and the private gas companies to leave. Thus much anxiety was focussed on the possibility that PEMEX might rebuild its facility. When, on December 2, the Interministerial Commission issued its preliminary findings and recommendations stipulating that the facility not be rebuilt and that the private gas distributors relocate, the people of San Juanico felt a strong sense of relief and moral vindication. However, much unease persisted because nothing had been done to remove the wreckage of the PEMEX facility, which presented a macabre backdrop to the newly constructed park. In addition, owing to the city's urgent demand for gas, all but two of the area's private gas distributors had resumed their operations with gas brought in by trucks from out-of-state PEMEX facilities.[14] Many in the community felt that soon it would be business as usual for these hazardous firms.

The third and very important component of Reconstruction I was the process whereby victims received compensation. Although not without its harsh

critics, the speed and efficiency with which most of the surviving victims were awarded monetary compensation was one of the truly remarkable features of the Mexican case. The process involved a series of complex legal and administrative steps, including, first, assigning legal responsibility for the explosion; second, devising a mechanism to evaluate and set compensation levels for death, for a range of types of injuries, and for property damage; and finally, setting in motion a procedure for disbursing payments to thousands of individuals.

The first step required assigning legal responsibility for the explosion. This was accomplished on the basis of the Attorney General's investigation. The preliminary report summarizing the investigation's findings was made public on December 22. In the report the Attorney General concluded that "the explosion started in the PEMEX facility" and that "PEMEX must accept its objective social responsibility" and "deliver the necessary funds to cover compensation for all material and personal damages." PEMEX's head, Mario Beteta then publically accepted the Attorney General's findings, "PEMEX assumes moral and civil responsibility for the disaster," and stated that PEMEX would announce the outlines of its compensation procedure the following week.[15]

At the outset, PEMEX would negotiate with its insuror (a consortium of 30 domestic and foreign companies) for the appropriate funds. In the absence of legislation to guide compensation to individuals and communities harmed by industrial accidents, the Attorney General's report recommended that compensation levels be determined on the basis of provisions set out in the federal labor law. This decision reveals a remarkable degree of flexibility on the government's part induced, perhaps, by a sense of urgency and a belief held at

the highest levels of the administration that the San Juanico situation had to be resolved in an effective and timely manner. The government's aim was to issue all compensations (including payments for loss of life, injury, and property damage) during the month of January.

According to official criteria, compensations for loss of life would equal 730 days of minimum wage, plus one-third again as much for moral injury, and one-third for funeral costs; the total to equal a little over U.S. $10,000 (at January, 1985 rates of exchange). These payments would be made for children as well as for adults (State of Mexico, 1985, p. 12). Beginning January 2, 1985, compensation payments for loss of life, along with those for damage to personal property, were issued by officials at the rate of 50 a day.

In addition, the injured were examined on an individual basis by a team of physicians and experts in labor medicine. Compensation was determined in each case according to a complex formula in which the extent of injury was established on the basis of functional, aesthetic, and psychological criteria.[16] Except for those still in hospitals, injured survivors were examined and processed at a rate of 25 a day in two nearby health centers beginning in early January.

The official report of the disaster issued by the State of Mexico during Spring of 1985 states that as of that time a total of 1886 claims (687 for material damages, 780 for injury, and 419 for death) amounting to 8.65 million dollars (at January, 1985 rates of exchange) had been paid to individual claimants in San Juanico (State of Mexico, 1985, p. 13).

Reconstruction II (November 21, 1984 - November 19, 1985)

The general recovery model posits a second phase of reconstruction encompassing developments shaping the long-term growth of the affected community. Activities characterizing this phase involve improvements in the community's physical structures, services, or facilities. This phase would hypothetically last approximately ten times as long as Reconstruction I. In the case of the San Juan Ixhuatepec disaster, Reconstruction II could thus be expected to last roughly two years (68 days times 10).

From the outset Reconstruction II assumed great significance in San Juan Ixhuatepec, with its associated activities and artifacts being invested with considerable ideological import. Perhaps for this reason, Reconstruction II activities overlapped and even preceded those of other periods. If the construction of the promised health center, technical school, and kindergarten run according to schedule and are completed by November, 1985, then Reconstruction II will have taken only half the time projected by the general model and typical of other historical cases of disaster recovery.

The present section provides a summary of the activities associated with Reconstruction II, including a short description of growing community opposition to the authorities' decisions and agenda. The political and ideological implications of Reconstruction II, including the State-community conflict over the terms of disaster recovery will be analyzed in a section to follow.

The major tangible elements of Reconstruction II in its initial phase were the large 14 hectare 'commemorative' park, along with paved streets and sidewalks throughout the affected area. In addition, there were other intangible, but very real, moral and ideological aspects to Reconstruction II implicit in the government's campaign of national solidarity with the victims

of the disaster.

On November 21, when the dust had hardly settled and bodies were still being recovered from the ruins, an unnamed official was reported to have announced that grass and trees would be planted at the scene of the disaster to provide "a visual buffer."[17] Shortly thereafter, the newly constituted Interministerial Commission declared that the PEMEX facility would be replaced by a park. These declarations were met with universal approval among the public at large who felt that restitution was owed to the survivors of the devastated community. This spurred activity and planning for the park. Even before residents were allowed to return to their homes in the affected areas of San Juanico, the first steps were taken to implement these decisions. The realization that the park would be located in their own community rather than on PEMEX's land ignited the first of a series of anti-PEMEX, anti-government demonstrations. On November 25, less than one week after the explosion, an estimated 20,000 San Juanico residents assembled in the cordonned-off zone demanding that PEMEX and the gas distributors leave the area and that the demolition of houses be halted.[18] The generally adversarial tone of the demonstration was tempered by expression of thanks to the firemen and troops for their efforts during the emergency.

This did not stop the bulldozers. By November 29, ten days after the explosion, the demolition of the core zone was complete. Newspaper accounts recorded numerous expressions of community dissatisfaction and anxiety during the days that followed. Many complaints focussed on perceived incompetence and corruption in the delivery of food and relief assistance. Other criticisms were levelled at what was seen as the forcible relocation of people from the core zone and at the inadequate size of the housing provided at Valle de

Anahuac. Community sentiments found expression in slogans painted during the night on walls and sidewalks: "No park. We want houses," "Where did all the aid go?" "PEMEX and gas companies get out."[19]

On December 11, the severely beaten body of a community leader was found on a nearby hillside. This event, along with the abrupt transfer of a parish priest who had been critical of PEMEX and the government, helped escalate tensions.

On December 16, survivors voiced their dissatisfaction in a large community meeting which issued a formal written petition demanding that: (1) "our tragedy not be used for political ends," (2) a complete account be made of all assistance donations; (3) fatalities be compensated at a rate of no less than U.S. $17,000; (4) forcible relocations be halted and that housing be reconstructed in San Juanico itself; and (5) the government take down the official banners and political signs it had placed throughout the community. When the meeting was broken up by the police, people reassembled and demonstrated at a site nearby.[20]

On December 23, the day following the Attorney General's report, members of the community held another march, demonstration, and assembly. The action was sponsored by a newly constituted Neighborhood Committee. San Juanico was generally unimpressed by the Attorney General's findings since it had been obvious to them for over a month that the explosion started at PEMEX and not elsewhere.[21] They were likewise unmoved by the promise of a soon to be completed park equipped with basketball courts, grass, trees, lighting, and a fountain, arguing that it should have been built at the PEMEX site. Noting the incidence of anguish and emotional upset resulting from the disaster, and arguing that the daily sight of the burnt tanks and exploded cylinders was an affront to the survivors, the Neighborhood Committee demanded that PEMEX at

least remove the wreckage from its facilities. While the assembly was tense for fear of reprisals and arrests, its message was clear: "We want a just compensation, not charity."[22]

The next step in the confrontation between the authorities and the community was over the terms of the compensation process. Following the Attorney General's report, PEMEX announced that it "accepted its moral and civic responsibility, but no blame, since the disaster was caused by an accident inherent in the hazardous nature of this type of facility."[23] PEMEX, moreover, assured the public that all damages would be covered in a prompt and orderly way in a short period of time. These assurances did not molify the Neighborhood Committee whose members argued that the official figures drastically underestimated the number of victims. On January 1, 1985, the Neighborhood Committee issued its own estimate of the toll: 2,000 dead, 3,000 wounded, and 1,500 missing.[24]

Over the following weeks, as claims for material damages, loss of life, and injury were being processed, community anxiety reached a high point.[25] On January 11, the PSUM, a coalition of left-wing opposition parties, charged that the San Juanico victims were being cheated. PSUM cited Articles 1913 and 1915 of the Labor Code stipulating a payment equivalent to 2,800 days of minimum wage per death, instead of the lower figure of 730 days used to calculate the official compensation levels.

In a few days, this charge was followed by a large public assembly called by the Neighborhood Commmittee. During the meeting residents aired a wide range of complaints revealing the depths of their frustration and dissatisfaction with the government's handling of the recovery. The strongest protests focussed on the "arbitrary, capricious, and unjust" compensation procedure,

including what were perceived to be unjustifiably low compensations for material damages, an underestimation of the number of casualties, and the setting of lower compensations for women. At a time when work on the park was nearing completion, many of the survivors still viewed it as "an affront."[26] Residents also deplored the government's refusal to accept offers of foreign medical assistance for severe burn cases.

Underlying all the demands and complaints was a widely shared feeling that the authorities were acting in a disrespectful, highhanded, and intimidating manner toward the community, using its troubles for their own political ends.

DISCUSSION

Judged on the basis of conventional indicators and measures, there is no doubt that San Juan Ixhuatepec's recovery from disaster was both rapid and effective. To a large degree, this was because the State immediately assumed decision-making power over virtually all aspects of the recovery process. While criticism has been levelled at the quality of State-provided recovery assistance (e.g., incompetent hospital care, a poor location and inadequate size of substitute housing, relatively low sums paid in compensation to the victims), a strong case can be made that swift and comprehensive assistance accompanied by immediate physical reconstruction is more just and less damaging in the long-term than more ambitious programs and higher compensations that might be obtained after long delays and years of litigation.

However, the authoritarian-paternalistic model of disaster recovery is not without its costs and hidden injuries. By its nature calamity disrupts people's lives and deprives them of control over their day-to-day routines.

Therefore, one important task of disaster recovery is to progressively restore an effective decision-making sphere to a population temporarily traumatized and rendered dependent. The cost of an authoritarian approach is that it impedes this process, creating new dependencies and, at times, intense resentment among the survivors. As demonstrated in the case of San Juanico, parts of the recovery program were challenged by members of the community who rapidly organized themselves into a pressure group to oppose the State's agenda and protect themselves against its more repressive measures.

Three aspects of San Juanico's recovery from disaster merit discussion. First, the role of public pressure in spurring the government's swift, full-scale involvement in disaster management reveals a great deal about the ideological and symbolic import of the event. Second, San Juanico's experience following the disaster raises questions about the possibilities for community involvement in decisions affecting both their immediate well-being and those leading to long-term changes in the community's land use and vulnerability to future hazards. The boundary between State authority and community power also underlies to the final issue addressed in this paper: the evolution of high risk urban ecological settings in rapidly industrializing countries. The lessons provided by recent disasters such as those of San Juan Ixhuatepec, Cubatâo, Bhopal, and Ciudad Juarez have yet to be fully understood and assimilated by urban planners and risk experts.

Public Response to the Disaster

Within hours of the explosion, Mexico City's population was riveted by accounts transmitted by radio and television crews who had rushed to the scene of the disaster. For days thereafter deep feelings of empathy expressed in

the often-voiced term 'solidaridad' created an expanded sense of community among the metropolis' heterogeneous groups and classes. 'Solidaridad' also resulted in such a large flow of material support from concerned individuals (primarily in the form of food, clothing, and blood) that the official distribution channels were overwhelmed. The day-to-day operations of some of the Federal District's 16 municipal centers came to a halt as the staff attempted to handle the large volume of donations.[27] In many cases the logistics and available manpower were not equal to the task of assembling, organizing, transporting, and delivering the mass of individual donations to the various shelters. After two days, authorities requested a halt to all assistance in kind and asked that, in the future, donations be limited to cash contributions to a disaster relief fund. As a result, much public effort then went to organizing benefits (concerts, plays, auctions, and boxing matches) to raise money for the victims.

From the beginning, radio and television played a pivotal role in shaping the public's response to the event. Because the day following the disaster was a national holiday, no major newspaper accounts of the event were available until November 21. Radio and television filled this vacuum with compelling on-the-scene accounts of the rescue efforts. In the hours following the emergency, television and radio stations disseminated important information on the location of evacuation shelters and the hospitals treating the victims. In addition, television and radio played a role in coordinating individual donations with particular needs and relief organizations. Television reporters were even able to help target assistance to specific shelters when they notified their stations of specific needs at different relief centers. This information was subsequently broadcast over the air to the public gener-

ating prompt and appropriate contributions.

Another example of public response to the disaster was the use of the Basilica of Guadalupe during the days following the explosion. As thousands of refugees, many of whom were injured, frightened, and disoriented, began to arrive at the shrine, Church officials decided to open the original edifice to shelter the victims. This building, dating back to colonial times, has been closed for over a decade because it is structurally unsound. Yet, for the public at large, it is more venerated than its modern successor. As San Juanico's victims flocked into the ancient shrine, hundreds of people from the working-class neighborhoods in the vicinity brought them blankets, hot food, and clothing.

The scene of victims of a terrible industrial disaster spontaneously seeking sanctuary at the Basilica where they were helped and fed by others of humble means created a powerful emblematic image in the eyes of millions of Mexican television viewers. However, in the following weeks the flow of public solidarity diminished somewhat. By mid December an epidemic of 'San Juanico' jokes raged through the city. Although television and radio refused to air most of these jokes, generally regarded as "tasteless" and "cruel," many nightclub comedians delighted their well-heeled patrons with a cascade of macabre puns and one-liners. These were subsquently repeated during pre-Christmas parties so that each morning the city awoke to a new crop of grisly jokes. The phenomenon did not pass unnoticed by working-class comedians and others who condemned the class-biased nature of the humor.[28]

In addition to the sour elements introduced by the San Juanico jokes another, perhaps predictable, response emerged during the aftermath of the disaster. This was the almost inevitable feeling that there was corruption

among government officials carrying out the relief operations. A strong consensus, nurtured by the metropolitan population's endemic cynicism, held that authorities had pocketed most of the donations and that the victims had only received a pittance.

Despite the cracks in public solidarity emerging in the weeks following the disaster, the people of San Juan Ixhuatepec were able to build new links to certain middle-class groups. In addition to the involvement of private voluntary and religious charitable organizations, a significant new link was established with Mexico's most influential environmentalist group, El Movimiento Ecologista Mexicano. The implications of this development will be discussed in the section to follow.

Despite the countercurrents cited above, the overwhelming public solidarity with the victims along with the widespread belief that San Juanico had been ill-used by PEMEX, had one critical effect: it put considerable pressure on the government to assist the victims, investigate the cause of the accident, and assign responsibility for the disaster. It also led people to raise the possibility that other accidents and hazards were endemic to metropolitan existence.

State vs. Community Decision Making

In the wake of the intense public pressure built up during the emergency, it became critically important for the State to demonstrate that it was actively helping the victims and, moreover, that solutions were in its hands. Officials assimilated the rhetoric of solidarity, congratulating the public for its outpouring of assistance, reassuring them at the same time that the proper authorities had the situation well under control. As various govern-

ment agencies did, in fact, assume control over decision making, many in the community awoke to the fact that the State might be encroaching too far. Discussions in neighborhood assemblies led to the formal petitions described in the prior section that articulated the community's most pressing concerns.

Some of these concerns involved the manner in which the government captured the phenomenon of solidarity and made it serve its own purposes. The most obvious examples were the numerous official banners and slogans painted on walls advertising the State's "solidarity with the people of San Juan Ixhuatepec." Many in the community found these to be unnecessary, self-serving, and offensive, and wanted them removed.[29]

Another issue was the distribution of relief supplies which many residents viewed as fraught with problems and "irregularities." Whatever the merit of these suspicions, many in the community felt that problems arose because "outsiders were distributing food to outsiders."[30] Many in San Juanico believed that a local committee headed by the parish priest should have organized these distributions so that assistance could reach the right people.[31]

Another State decision which was bitterly resented by the survivors was the government's refusal of outside (mostly North American) offers of specialized medical assistance for the burn victims. Officials had, indeed, announced that Mexico could take care of its own people. However, the relatives of those who were hospitalized with severe burns felt that matters of national pride had little to do with them and that government officials should not have taken upon themselves the right to reject this type of help.

The decisions involved in the matter of the political banners, relief supply distribution, and medical care for burn victims affected relatively

short-term, or in the case of the burn victims, individual, aspects of the overall recovery effort. Other contested areas involved decisions with more long-term, community-wide effects.

The principal focus of conflict was (and remains) the designation of the 14 hectare devastated zone as a park and the consequent displacement of almost 200 families from their homes and the community. From the community's point of view the allocation of such a large amount of prime residential land for a park was an inordinate luxury. The fact that the decision was made with virtually no community input at a time when the affected families were scattered in shelters, hospitals, and a distant housing project was viewed as highhanded and arbitrary. The fact that the government has, so far, refused to consider using a portion of this land to build houses for those who might wish to return reinforces community suspicions that the park is really intended as a buffer between what remains of the old San Juanico and a facility PEMEX might choose to construct in the future.[32]

The Neighborhood Committee has established links with the Movimiento Ecologista Mexicano, a growing environmental lobbying group comprised primarily of middle-class professionals and planners. In the months and years to come the limits to State authority may well be challenged over questions of contested land use, including the size of the park, the permissible future uses of the PEMEX site, and the relocation of the private gas firms still operating in the area. An alliance between a representative grass-roots pressure group in San Juanico and the country's largest environmental organization may be able to effect a long-term improvement in the valley's hazardous ecology.

Limited Options for a High Risk Setting

San Juan Ixhuatepec will, no doubt, be remembered both in Mexico and abroad as an example of a successful recovery from disaster. Many will compare it favorably to the legal morass resulting from Bhopal. However, swift compensation and a hastily constructed park do very little to change the intrinsic hazardousness of a place like San Juanico. Measures leading to a genuine reduction of overall risk for the survivors of the gas disaster are considerably more costly and difficult to implement.

The community itself identified an important step: the relocation of PEMEX and its associated private gas distributors. This demand was taken up enthusiastically by the press, some opposition parties, and the public at large. In the weeks following the disaster public consciousness was alerted to other potential time bombs woven into the fabric of the city: the massive Azcapotzalco refinery, the International Airport, and a munitions factory near the center of town. While relocation of the Azcapotzalco refinery would appear to be prohibitively expensive, there is considerable discussion about decentralizing the city's gas provisioning system. However, as the head of the private gas distributor's association aptly pointed out, the cost of gas to consumers would undoubtedly rise as trucks would have to travel an extra 50 kilometers or more to reload. He might have added that trucking large amounts of gas would also inevitably result in road accidents such as the 1978 collision of an LPG truck on the Mexico-Queretaro highway that resulted in up to 100 casualties.[33] While decentralization would reduce hazards for neighborhoods such as San Juanico, transporting large quantities of gas over Mexico's congested highways may pose even higher overall levels of risk than exist in the present system.

A second measure to reduce the hazardousness of San Juan Ixhuatepec would involve tighter controls and safety regulations governing the numerous remaining industries handling dangerous materials. This option, while worthwhile, runs into the familiar difficulties implicit in restraining industry during difficult economic times.

It is unrealistic to expect environmental safety regulations to be imposed selectively upon industries in San Juan Ixhuatepec. However, certain measures specific to San Juanico's environmental health might be more feasible. One example would be to cover the Remedios River, at present a steep-banked open sewage canal. It appears that this measure might be carried out in the near future as the result of a projected extension of the Anillo Periferico, the urban freeway system. The Anillo would follow the river, thereby covering it, but would also divide the community into two parts separated by a six lane highway.

A final measure that would decrease San Juanico's exposure to industrial risk would be the implementation of a careful land use zoning plan aimed at separating densely populated residential areas from facilities handling hazardous materials as well as from those facilities' arteries of transit. Unfortunately, owing to the speculative forces at work in the urban land market, effective zoning is perhaps the most elusive goal of all. San Juan Ixhuatepec's present land use is the outcome of a complex mosaic of tenure rights and appropriations encompassing federally owned land such as that occupied by PEMEX and the rail line, municipal property such as the Remedios River, private holdings which are part of the open land market such as those of the former hacienda and industrial firms, former peasant holdings which enter a semi-open market, and nonmarket holdings characteristic of the hillside squatter settlements.

An effective zoning plan must come to terms with these diverse forms of occupance. Population pressures and vigorous speculative forces operating upon real estate have so far defied most efforts at implementing existing zoning and environmental regulations in Mexico City. Clearly San Juan Ixhuatepec's plight is only a small part of a much larger chronic problem.

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NOTES

[1]See E. Haas, R.W. Kates, M. Bowden, eds., Reconstruction Following Disaster, MIT Press, 1977.

[2]According to A. Peñafiel's Nombres Geográficos de México, México, 1885, the prefex 'izhuatl' signifies 'leaf of green maize.'

[3]The painting depicting Fray Pedro de Valencia baptizing a man in Indian garb dates from 1796. The church facade underwent renovation, including the addition of a clock, in 1929.

[4]Mexico City, with a current population of roughly 18 million is expanding at the rate of 1.5 million people a year making it the largest and the most rapidly growing urban agglomeration in the Third World. Conservative estimates project the city's population to be 26 million in the year 2000; more pessimistic projections cite a population doubling to close to 36 million people. See F. Pearce, "Mexico, the city unlimited," in New Scientist, October 18, 1984.

[5]Although, until recently, no systematic data were available, most experts agree that the combination of Mexico City's altitude, its basin topography, and emissions from its largely unregulated industries and two to three million vehicles, make its air pollution problem among the worst in the world. According to one recent estimate Mexico City generates 4,600 tons of air pollutants a day, most of these in the northern sections of the city where most of the factories are located. See R. Monje, "Alarma en el extranjero, no aquí, la veloz degradación ecológica del Valle de México," in Proceso, January 28, 1985.

[6]In a November 26, 1984 article in Proceso magazine, Heberto Castillo describes the hazards of Mexico City's system of underground gas pipelines, many of which were installed over 20 years ago. Castillo warns that many of these pipelines are damaged, obsolete, and prone to leaks. Most alarming, Castillo asserts, is the fact that in many cases the plans locating some of the older pipelines (including those in San Juan Ixhuatepec) have been lost, making it extremely difficult to repair or replace them.

[7]Personal communication by an official in the Federal District's disaster planning unit, SIPROR, as well as by personal observation.

[8]PEMEX has consistently refused to release information which might shed light on the cause or causes of the explosion. Extra official versions abound. The most plausible explanation is that a leak from an overfilled tank ignited and caused an explosion which subsequently resulted in a chain reaction of explosions in the remaining tanks. This explanation is supported in part by numerous statements made to the press by San Juanico residents who observed that the flare that burns off excess gas was out during the weekend preceding the Monday disaster. There also appears to be a consensus among residents that a strong order of gas built up in the vicinity of the plant on Sunday. The high casualty rate and a large proportion of the severe burn cases can be attributed to the gas cloud that seeped into dwellings and settled over the streets of the community during the course of Sunday night.

[9]This table was compiled on the basis of unverified and sometimes inconsistent newspaper accounts in Excelsior, Uno Mas Uno, and El Universal.

[10]Considerable discrepancies exist between extra official and official estimates, and even among different official estimates, of the number of casualties. Community estimates invariably tend to be higher than government figures. Yet even the latter are often widely inconsistent. For example, the Interministerial Commission issued a report on December 2, 1984 stating that the number of wounded was 4248. However, another report compiled by the Director of the State of Mexico's Occupational Safety Institute puts the figure at "over 2000" (State of Mexico, 1985, pp. 3). A subsequent report published in the April, 1985 issue of The Pan American Health Organization's (PAHO) "Disaster Preparedness in the Americas" records a mere 886 hospital admissions resulting from the disaster.

[11]This plan of action is outlined in a report authored by Ing. Federico Lopez de Alba, Director of the State of Mexico's Occupational Safety Institute, translated into English with the title "The San Juan Ixhuatepec Accident," State of Mexico, 1985.

[12]Field interview with Dr. Rodriguez Perez.

[13]Field interviews with relocated survivors in Valle de Anahuac.

[14]In the weeks following the disaster Mexico City and its surroundings experienced critical shortages of domestic gas as PEMEX and the gas distributors had to organize an alternative delivery system to make up for the 40% supply shortfall resulting from the San Juan Ixhuatepec facility's destruction. Many people responded to the shortage by hoarding tanks of gas in their houses. This, in turn, resulted in several incidents in which individuals died from gas poisoning and explosions.

[15]Excelsior, December 23, 1984.

[16]Field interview with Dr. Vasquez Caleb, in the San Juan Ixhuatepec Health Center and visits to two compensation claims centers.

[17]Uno Mas Uno, November 22, 1984.

[18]Excelsior, November 26, 1984.

[19]Personal observation.

[20]Uno Mas Uno, December 17, 1984.

[21]People in San Juanico as well as the public at large were outraged by what was widely regarded as arrogant stonewalling by PEMEX's director, Mario Ramon Beteta. In particular, during one television interview when he was asked whether PEMEX would compensate the disaster victims, Beteta exclaimed that, as the prime victim, PEMEX should be the first in line when compensations were handed out.

[22]Excelsior, December 24, 1984.

[23]Excelsior, December 27, 1984.

[24]Uno Mas Uno, January 2, 1985.

[25]Field interviews in San Juanico and Valle de Anahuac.

[26]Field interviews in San Juanico, and Uno Mas Uno, January 14, 1985.

[27]Personal interview with a high official in the Alvaro Obregón municipal delegation.

[28]Carlos Monsivais provides an insightful analysis of the problem in "Los chistes sobre San Juanico, otra expresión de la lucha de clases," in Proceso, December 31, 1984.

[29]Field interviews in San Juanico, and Oscar Hinojosa, "Agresión oficial, respuesta a las demandas de reparación en San Juanico, in Proceso, December 24, 1984.

[30]Field interview in San Juanico.

[31]Field interviews in San Juanico.

[32]Field interviews in San Juanico and Valle de Anahuac.

[33]PEMEX has been plagued with accidents and, according to critics such as Heberto Castillo, was criminally negligent in the case of maintenance and safety at its San Juan Ixhuatepec facility, "La Comisión de Seguridad de Petróleos avisó de los graves riesgos en San Juanico," in Proceso, December 10, 1984. The table on the following page assembles a partial list of PEMEX gas-related accidents in recent years.

SOME RECENT PEMEX ACCIDENTS*

DATE	LOCATION	SCALE
1963	Azcapotzalco Refinery	4 tanks of jet fuel explode
1971	Mazatlan Port	Gasoline pipeline spill results in large fire
1977	Azcapotzalco Refinery	Fire, 10 injured
1978	Mexico-Queretaro highway	LPG truck collides, fire and explosion kill 100 and injure 100
1978	Santa Cruz	Methane gas explosion, 52 victims
1981	Veracruz	LPG pipeline leak explosion and fire destroy settlement
1982	Mexico City Vicinity	Pipeline explosion kills 10 and injures 30
1983	Azcapotzalco Refinery	Fire
MARCH 1984	San Juan Ixhuatepec	Fire and explosion near storage tanks, residents evacuated at 9 pm
APRIL 1984	Acachapan, Tabasco	Gas pipeline explosion, 11 dead and 44 injured
JUNE 1984	Colmenas, Tabasco	Gas pipeline explosion, settlement destroyed
JULY 1984	Los Pajaritos, Veracruz	Ammonia gas pipeline leak kills 4 and injures 46
JANUARY 1985	Cuidad Juarez	Gas pipeline explodes killing 1 and injuring 29

*This is an incomplete list compiled from a variety of unverified extra official sources. With the exception of the San Juan Ixhuatepec and the Azacapotzalco refineries, only transport and storage accidents are recorded.