April 12, 1985

INFORMATION: Report on San Juan Ixhautepec, Mexico LPG Accident

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Attached for your information is an additional report prepared by Mr. B.F. Olson, and an analysis by Jose L. de la Fuente, on the LPG accident of November 1984 that occurred near Mexico City, Mexico. The report is copyrighted by Olson Engineering Company. It was presented to the United States Government in appreciation for the information exchange between Jose and the report's author, Mr. B.F. Olson which occurred when they were in Mexico attempting to obtain information on the accident cause.

During their site visits, neither Mr. Olson, nor Mr. de la Fuente were able to obtain any official reports other than official news releases); however, from an evaluation of information collected at the site and from unofficial sources, and logical assumptions, they each have concluded that overpressuring of the LPG facilities from the pressure of the pipeline supplying the plant was the probable cause of the accident. I agree with their conclusions.

We in OOE believe that an operator of a jurisdictional pipeline supplying a hazardous liquid to a nonjurisdiction terminal (similar to the facilities involved in this accident) is required by Part 195 to provide pressure control and/or relief at the terminal end of the pipeline. In the past we frequently have found operators with inadequate controls. This inadequacy, in most cases, has been due to the operator's lack of understanding of the regulations. Because the intrastate operators are not required to comply with Part 195, we anticipate that there may be many more intrastate pipeline-terminal facilities with inadequate controls. We will focus on this area of intrastate operations when we start inspecting intrastate operators, and also advise participating state agencies of our emphasis. In the meantime, we are developing a recommendation to correct this shortcoming in the regulations, and will submit it to DMT-30 in May 1985.

JT
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March 21, 1985

INFO/Analysis: Olson Engineering Company Report on San Juan Ixhuatepec, Mexico LPG Disaster

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Dr. Robert L. Paullin, Associate Director for O&E (DMT-10)

The report prepared by Ben Olson, postulates his belief that the LPG disaster was caused by overpressuring of at least one horizontal tank while being filled at the southwest corner of the plant. The assumptions he makes and the evidence he presents are convincing and, coupled with the information I acquired, I tend to agree with Ben, that overpressuring was the probable cause of the disaster.

Information supplied to me recently by our Embassy in Mexico City and from a magazine I picked up while in Mexico, supports Ben's report.

The information supplied by our Embassy consists of press releases from the Mexican Attorney General's Office and from Pemex. The magazine I acquired has an article on safety inspections performed at the plant in September, October and on November 5, 1984, just two weeks prior to the explosion.

The Attorney General's press release states that the explosion initiated from a sector of horizontal tanks located in front of the storage spheres, but lacks details.

The magazine article states that a safety committee inspected the plant facilities on September 17, October 5, and November 5, 1984, and found among other deficiencies, the following:

(1) "Relief valve on the Poza Rica - Mexico LPG pipeline receiving manifold is missing.

(2) "An additional relief valve is needed on the receiving manifold for the Minatitlan - Mexico LPG pipeline now that flow has been increased to 75,000 bbl/day.

(3) "The pressure gauge on the receiving manifold for the Minatitlan - Mexico LPG pipeline gives erroneous readings.

(4) "Approximately 25% of the pressure gauges on the horizontal tanks as well as the spheres are in bad shape."

The report concludes that, as of November 5, 1984, none of the deficiencies had been rectified. This information, again, gives credence to the probability of an overpressure condition.

The Pemex press release on the day of the explosion is probably the most significant statement, along with the ruptured horizontal tank, that lends credence to the probability of an overpressure condition. The press release, as if to show the world that nothing was wrong with the Pemex Plant, states that pumping and flow from the pipelines supplying the LPG plant continued at a "normal level" even after the explosion occurred and was not shut down until 6:40 a.m., one hour after the initial explosion.

The obvious questions triggered by this statement are the following:

(1) Why wasn't the pipeline shut down immediately after the explosion?

(2) Since it is known that the thru-put on the Minatitlan - Mexico LPG system had been increased to 75,000 bbls/day, where did the 3,125 bbls that can be pumped in one hour go? Did they feed the fire? Photos 29 and 30 on Page 41 show a fire which appears to be fueled.

(3) Does the probable rapid release of a large volume of gas discharged prior to failure through the safety valves of the overpressured tank and three others which may have been being filled at the same time, coupled with the high probability that pumping continued at full flow for an additional hour after the explosion, explain the massiveness of the spill and why no alarm or warning was received by the community?

This scenario appears likely, based on the minimum facts gathered, but may not be conclusive. There are many gaps in the report which need filling before definite conclusions can be drawn.

However, paraphrasing the Attorney General's report, there exist sufficient elements to sustain a technical opinion with a reasonable degree of probability that this is what happened in San Juan Ixhuatepec.

The main causal factors appear to be the human element, maintenance problems, and inadequate relief capacity and pressure control. Contributing to the severity of the accident was the manifolding of the tanks in each row to a common header and the probability that the outlet/inlet valves to each tank were open, primarily in row #1 which is where the accident originated. As the first tank failed, the piping run also failed and this in turn started a chain reaction. Also, either due to damage from the initial explosion and the BLEVED* horizontal tanks, or due to overpressuring, the fill lines to the four 10,000 bbl spheres leaked and the gas ignited, creating fires which impinged on the bottom of the spheres causing them to overpressure and explode almost simultaneously. Also, contributing to the severity of the accident was the failure to shut down the pipeline system promptly.

Pemex Press Release

November 19, 1984

The following information is provided regarding the accident which occurred this morning in the Town of San Juan Ixhuatepec in the State of Mexico:

1. In accordance with the data gathered from the accident site, the accident originated outside of the Pemex installations. According to the report from the Sub-Directorates for Primary Production and Industrial and Commercial Transformation, pumping to the storage and distribution plant at Ixhuatepec continued at a normal level until 6:40 a.m., including after the announcement that an explosion had occurred. This indicates that the operation of the plant was adequate.

Attorney General's Office - Press Release
December 22, 1984

Page 1 - From the analysis made, it is evident that the accident which destroyed the Pemex Plant and directly caused major personal and property damages in San Juan Ixhuatepec, originated principally from a sector of horizontal tanks located immediately in front of the storage spheres in the Pemex Plant.

There was a conflagration as a result of a massive escape of gas, which was presumably ignited by a flare in the plant. There was also an explosion of tanks and other artifacts.

Page 2 - The practically total destruction of the Pemex Plant in San Juan Ixhuatepec and the death of the majority of the Pemex employees on duty November 19, 1984, deprives us of certain data which would be invaluable to ascertain with greater preciseness the characteristics of the conflagration. However, there exist sufficient elements to sustain a technical opinion with a reasonable degree of probability without incurring categorical affirmations lacking due foundation.

Page 3 - Pemex provided the documentation which analyzes the ordinary maintenance problems at this plant, and it is concluded that same could not by themselves have been the cause of the occurrence under evaluation. Said analysis forms part of a group of documents integral to this report.

There's 4 other pages along with the original that are Spanish.