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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

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Forwarded to:

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SAFETY RECOMMENDATION(S)

P-82-28

On August 25, 1981, at 1:33 p.m., P.d.t., in downtown San Francisco, California, a 16-inch natural gas main owned by the Pacific Gas and Electric Company (PG & E) was punctured by a drill that an excavation contractor was using to set tiebacks for anchoring his excavation shoring. Escaping natural gas blew upward and carried into the Embarcadero Complex and other nearby buildings. There was no ignition; however, the gas stream entrained an oil containing polychlorinated biphenyl (PCB). Fall-out affected an eight-square-block area of the city's financial district covering buildings, cars, trees, pedestrians, police, and firemen. No one was killed or seriously injured, although many persons were sprayed with the PCB oil mist. 1/

In December 1980, Tronoff Associates prepared a topographic and utility survey for Daon Corporation as an initial activity in preparation for the construction of a 23-story high-rise building. The survey showed surface and underground utility lines on Sacramento, Battery, and Halleck Streets, the three streets bordering the construction site. A field survey located existing surface utilities but all underground utilities were posted from records of the utility companies and were so indicated on the survey drawing by a utility note.

On April 16, 1981, Turner Construction Company, the general contractor for the high-rise building, sent a copy of the topographic and utility survey to the consulting engineer who was to make the shoring design calculations and plans for Pomeroy, the excavation and shoring subcontractor for Turner. The consulting engineer did not contact PG & E for additional information and used the survey drawing to establish a 6-foot separation between the 16-inch gas main and the curb line where the sheet pile was to be driven. Based on his past experience, the consulting engineer assumed that the gas main was at a depth of 2 feet.

The consulting engineer did not post the location of the gas main on his drawings, but did include several cautionary notes in "Driving Criteria for Sheet Piles and Procedures for Installation of Tiebacks" which indicated the general contractor's responsibility for the protection of utilities. These notes related to the monitoring, supporting, moving, and removing of utilities but did not expressly require a check on their locations with the utility companies.

1/ For more detailed information, read Pipeline Accident Report--"Pacific Gas and Electric Company, Natural Gas Leak, San Francisco, California, August 25, 1981" (NTSB-PAR-82-1).

On April 23, 1981, Turner made a telephonic request to PG & E for maps showing the location of underground facilities in the area of Battery Street, from Sacramento to Halleck Streets. The maps mailed to Turner by PG & E were clearly stamped "NOT RESPONSIBLE FOR ACCURACY" and "FOR STUDY PURPOSES ONLY," and were similar to the maps Tronoff had been furnished by PG & E and which Tronoff used in preparing the topographic and utility survey.

On July 17, 1981, the City's Department of Public Works approved a permit which granted permission to Turner to "excavate and shore in Sacramento, Battery and Halleck Streets for the purpose of constructing the foundation for ...(a high-rise building)... in accordance to the shoring plans ...prepared by..." the consulting engineer for "... Pomeroy..." The permit specified that "The permittee shall verify the location of City facilities and the facilities of the public service utility companies that may be affected and shall assume all responsibility for any damage to such facilities due to the work authorized under this permit," (emphasis added).

Title 8, Article 6, Section 1540, of the State of California's Construction Safety Orders provides:

> 1540. General - All Excavations. (a) Exposure...
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> (1) Prior to opening an excavation, effort shall be made to determine whether underground installations; i.e., sewer, water, fuel, electric lines, etc., will be encountered, and if so, where such underground installations are located. When the excavation approaches the approximate locations of such an installation, the exact locations shall be determined by careful probing or hand digging, and when it is uncovered, adequate protection shall be provided for the existing installation. All known owners of underground facilities in the area concerned shall be advised of proposed work at least 48 hours prior to the start of actual excavation.

No one made an attempt to locate the 16-inch gas main by probing or hand digging.

USA-North, the one-call notification service in the San Francisco area, was used by only one of the contractors involved in the Daon Building construction project. PG & E, in response to a request made by Harding-Lawson, located its 16-inch gas main and other facilities buried beneath the streets around the excavation site and marked the locations on the pavement with yellow paint. The notification service was provided free and the information permitted Harding-Lawson to modify the intended locations of its soil test bore holes and ground water observation wells and contributed to their safe completion.

No other contractor involved in this project made use of the one-call system to request that PG & E locate its underground facilities around the excavation site. Had PG & E been informed through the one-call system that tieback drilling was to be done which would extend under the street and beneath its 16-inch gas main, it would have been able to assure that its main was exposed so that the tieback design specifications along Battery Street could have been checked and modified if necessary and the installation work could have been monitored.

The northern California one-call system would be more effective if its use was mandatory. Although the State of California's construction safety orders require that all owners of underground facilities be notified prior to the start of construction, and

provisions of the City's excavation and shoring permit require essentially the same thing, Turner failed to provide any notification to PG & E, but could have easily satisfied all legal requirements by use of the one-call system.

Local governmental agencies responsible for street and highway activities typically impose reasonable and necessary permit conditions for excavations and inspect the activities of permittees. These agencies could effectively require prior notification to the operators of underground facilities as a condition of any permit issued for work within their jurisdiction. Enforcement of this added condition could greatly reduce the potential for excavation related accidents and could be accomplished in the same manner as other long-standing permit requirements and conditions. Typically, noncompliance with permit requirements can result in an on-the-spot revocation of the permit or temporary halting of the work. Such action would be effective in bringing about compliance and would undoubtedly result in full compliance with the notification requirements.

As a result of its investigation of this accident, the National Transportation Safety Board recommends that the National Society of Professional Engineers:

> Advise its members of the circumstances of this accident and recommend that they confirm the adequacy of their design specifications in providing adequate clearance for affected utilities through consultation with the utility operators, and that they note on their design specifications and drawings that affected utilities are to be notified at least 48 hours in advance of actual excavation, using the one-call system where available. (Class II, Priority Action) (P-82-28)

BURNETT, Chairman, GOLDMAN, Vice Chairman, McADAMS and BURSLEY, Members, concurred in this recommendation.

By: Jim Burnett
Chairman