

Log P-257

NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.

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Forwarded to:

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President  
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SAFETY RECOMMENDATION(S)

P-84-31 through -34

On October 13, 1983, seven employees of the Washington Gas Light Company were assigned to perform required annual operating and maintenance inspections on a flow control valve and a pressure control valve at its Herndon Gate Station in Fairfax County, Virginia. As part of the work to be done, the employees disconnected the gas control signal line and removed the bolts of the flow control valve bonnet before inspecting the pipe segment containing the control valves to insure that it had been isolated and vented properly. At 10:13 a.m., while trying to remove the valve bonnet, natural gas at about 150 psig blew the bonnet upward, and gas filled the enclosed portion of the building in which the employees were working. The employees within the station fled outside to safety; however, the foreman reentered the building. Moments later, at 10:18 a.m., gas was ignited and explosion and fire, followed demolishing the building. The foreman was killed and two employees received minor injuries. 1/

The work to be performed on the day of this accident consisted of two routine but important operations. First, the Transco run had to be isolated from all gas under pressure and gas within the run had to be vented to the atmosphere. Second, the control valves installed within the run had to be disassembled, inspected, repaired as necessary, and reassembled and, the run had to be placed back into service. Only the first operation was involved in this accident.

Without reviewing the work to be performed and without providing specific instruction, the foreman directed the senior technician to "bypass" the station. This placed a non-supervisory employee in charge of the other crewmembers to perform work for which the employee had not been trained and for which no written instructions or procedures had been prepared. Moreover, his training and experience record provided no evidence that the senior technician was qualified to function as a supervisor. His position questionnaire held him responsible only for directing the work of a lower-grade employee who performed duties similar to his.

1/ For more detailed information, read Pipeline Accident Report--"Washington Gas Light Company, Natural Gas Explosion and Fire, Herndon Gate Station, Fairfax County, Virginia, October 13, 1983" (NTSB/PAR-84/03).

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The Safety Board recognizes that every aspect of a crew's work cannot reasonably be checked by a supervisor and it recognizes also that a supervisor need not be onsite for all work performed. However, those operations critical to the continued safe operation of a gas system and which pose substantial threats to employees and public safety should be performed only under the direct supervision of a qualified supervisor. WGL's Pressure Division recognizes the potential hazard associated with performing bypassing and isolation activities and requires that these operations be performed only upon specific instructions from the supervisor. Additionally, the Pressure Department's requirements recognize the value of a pre-work meeting to review the work to be performed with the workcrews before any work proceeds. Moreover, WGL's policy, although not specifically stated in any guideline, apparently was that the foreman should have been present during the time the bypassing and isolation activities were being conducted.

Many pipeline accidents investigated by the Safety Board could have been prevented had a qualified supervisor effectively directed specific activities critical to the safety of employees and the public. On October 1, 1982, at Pine Bluff, Arkansas, seven persons were burned and hospitalized while working to replace a section of pipe beneath a roadway. The gas company superintendent failed to monitor the pressure within a section of pipeline isolated from high pressure gas only by a closed valve. Gas leaking through the closed valve increased the internal pressure within the isolated segment which resulted in the failure of an end cap which had been welded temporarily on the end of the pipe segment to keep water and debris from entering the pipe. Gas escaping into the work area after the end cap failed was ignited and fire flashed through the work area.

The Safety Board believes that gas company managers should review and revise, if necessary, their maintenance and operation procedures to determine those activities where error on the part of its crews could result in unreasonable threats to the safety of its employees and the public. Where such conditions are found to exist, procedures should be developed to identify the potentially hazardous condition, and to emphasize the specific actions which should be taken to reduce the hazards to a minimum, and should require the presence of a qualified supervisor to assure that the required actions are explicitly followed.

Although the Pressure Department's written procedures contained safety precautions when performing work on self-contained or pilot-operated regulators, neither it nor the ITSD, at the time of this accident, had written procedures for safely guiding the bypassing and isolation of segments of pipeline from gas under pressure. Since the accident, WGL has promulgated written procedures for inspecting control valves; however, these procedures do not include detailed instructions on actions to take for isolating segments of pipeline, for assuring that the isolated segment is free of gas under pressure before disassembly is begun, and for assuring that the isolated segment remains free of gas under pressure while work is being performed.

During the investigation, WGL management personnel expressed their belief that the annual valve inspection report constituted a written checklist to guide the actions of its employees when bypassing and isolating segments of a pipeline and for performing the required inspections. These forms do not direct sequenced actions or prescribe any procedure which could serve to safely guide employees in performing the required task; these forms serve only to develop a written record of the maintenance actions taken and to record the results of tests and inspections.

Written procedures serve several useful purposes. First, they document a company's practice for performing specific tasks of a periodic nature and serve to preserve lessons learned either by experience or from analyses. Second, they form the basis for evaluating future accidents and changes in operations to determine what alterations are needed for maintaining the safety of the system. Moreover, written procedures can reinforce employee training activities by translating company policy and safety practices into a useable, consistent format. Third, such procedures also can serve as a ready reference for employees should they be unsure of an action to take and as a refresher for tasks performed infrequently.

Written procedures also can be abbreviated for field use through the development of step-by-step checklists to guide employees when performing work where an out-of-phase action or employee error reasonably could be expected to result in reduced safety of employees or the public. While the Board is not advocating such checklists as a substitute for a supervisor, it is likely that if the senior instrument technician had had a properly designed checklist to guide him in the task assigned him by his foreman on the morning of October 13, 1983, the accident would not have occurred. He would have been warned to test, by opening the vent valves, the effectiveness of the actions taken to isolate the line segment before disassembling any equipment or control lines.

Several employee actions just before the accident indicate insufficient understanding of company policies and procedures. The foreman relied upon the senior technician, a person untrained in supervising crews, to fulfill his responsibilities during the bypassing and isolation operations. This action was taken even though the foreman was aware that the senior technician had not performed these tasks at the Herndon Gate Station and he had given no explicit instruction to warn the senior technician of the importance of sequentially performing certain tasks. Also, after arriving on scene and conducting an inspection in which he could not help but have noted that operations had proceeded beyond those which he directed the senior technician to perform, the foreman failed to check that the sequence of actions taken before he arrived had been carried out properly. Further, the foreman's inspection of the work performed failed to detect that a valve that should have been closed was open even though its position would have been obvious through visual observation of an indicator.

The sequence of the actions taken by the senior technician indicates his lack of understanding of the manner in which control valves respond when control lines are disconnected from the valve operating mechanism. Furthermore, he accepted responsibility for performing a critical function not included within his position description and for which he had no training.

The circumstances of this accident, as well as those involved in the October 29, 1982, accident at Burke, Virginia, indicate the need for better training of WGL employees to support their understanding of procedures and to be alert to the potential consequences when such procedures are not carried out explicitly. While the Safety Board is pleased that WGL has intensified training given to its Transmission and Distribution Department employees, an equally intensive effort appears needed for all employees whose responsibilities involve operations wherein a failure to understand or to follow required safety procedures may result in injuries or death to employees or the public. Moreover, to provide necessary training consistently to all employees, WGL should reevaluate its current policy of assigning to individual departments the responsibility for determining the need for and carrying out all training. Decisions concerning effective training methods, course content for specific positions, and the frequency of training should be made by persons experienced in training in consultation with operating personnel. Additionally, by making these determinations centrally and with a directed

purpose of developing an effective employee training program, a more even balance between departmental production requirements and employee and public safety requirements likely will result.

Therefore, as a result of its investigation, the National Transportation Safety Board recommends that the Washington Gas Light Company:

Develop written procedures detailing the sequence of actions to be taken for safely bypassing gas facilities, for isolating segments of pipeline from gas under pressure, and for testing the adequacy of isolation actions before any work is performed on the isolated segment. Incorporate within these procedures requirements for conducting prework meetings to explain the work to be performed by each employee. (Class II, Priority Action) (P-84-31)

Assess departmental training activity to identify improvements necessary to adequately prepare employees to carry out safely all assigned responsibilities, correct deficiencies found, and evaluate the appropriateness of the policy which makes employee training a departmental responsibility rather than an integrated company activity. (Class II, Priority Action) (P-84-32)

Require that a supervisor trained in the company procedures for the work being conducted be present to direct all operations which, through employee error, would pose substantial threats to the safety of employees or the public. (Class II, Priority Action) (P-84-33)

Develop and implement the use of checklists for all work projects in which actions must be taken in an ordered sequence to avert safety hazards. (Class II, Priority Action) (P-84-34)

BURNETT, Chairman, GOLDMAN, Vice Chairman, and BURSLEY and GROSE, Members, concurred in these recommendations.

By: Jim Burnett  
Chairman

