5. Figure 5 is a view of the scene after removal of a number of burned pipes and components. The arrow on the figure indicates a combustible gas indicator detection point. Mr. Young stated that the facility had been equipped with both ultraviolet (UV) detectors and combustible gas indicators. At the time of the incident, the UV detectors had been bypassed in the emergency shutdown system, to prevent spurious alarms and shutdowns by workers in the area of the dehydrators. However, the combustible gas indicators were still on line to detect leaks from process piping. The combustible gas indicator detection point indicated in Figure 5 had been below the plastic sheets that were draped in the area. Thus, the detection point had not been blocked from the leak location.

6. Two solenoid controlled, pneumatically operated isolation valves that were removed from the fire scene are shown in Figures 6 and 7. It was reported that these valves had been in a direct line with the gas leak and the subsequent flame. Examination of the valves did not reveal any loose or exposed electrical connections, nor any items that could have produced ignition of the leaking natural gas.

7. Two witch's hat strainers that had been installed in piping adjacent to dehydrators D-102A and D-102C were provided to this investigation. The material of construction of the strainers was not conclusively identified; however, the flanges of each strainer were manufactured from carbon steel, and the flanges were then welded to the strainer meshes.

8. A 1971 assembly drawing for the dehydrators showed that the flanges of the bolted connection where the leak occurred were manufactured from SA-181 carbon steel.

CONCLUSIONS

1. It is unlikely that leaking natural gas from the bolted connection accumulated for any length of time prior to ignition. Although the plastic sheets draped in the area potentially provided an enclosure for accumulation of gas, the combustible gas indicator would have detected a leak before ignition. Additionally, there were no indications of an explosion in the area, as would have been the case had accumulated natural gas subsequently ignited.

2. Since the strainer flange and the pipe flanges of the bolted connection were manufactured from carbon steel, the most likely source of gas ignition was a friction spark that resulted when the section of the strainer flange was ejected after fracture. That is, ignition was concurrent with the leak initiation.

FIGURES 1 - 7

Photographic Prints

Figure 1 View of a spool piece that was removed from a vertical pipe section adjacent to dehydrator D-1028. The spool piece had contained a witch's hat strainer that fractured and led to a natural gas leak.

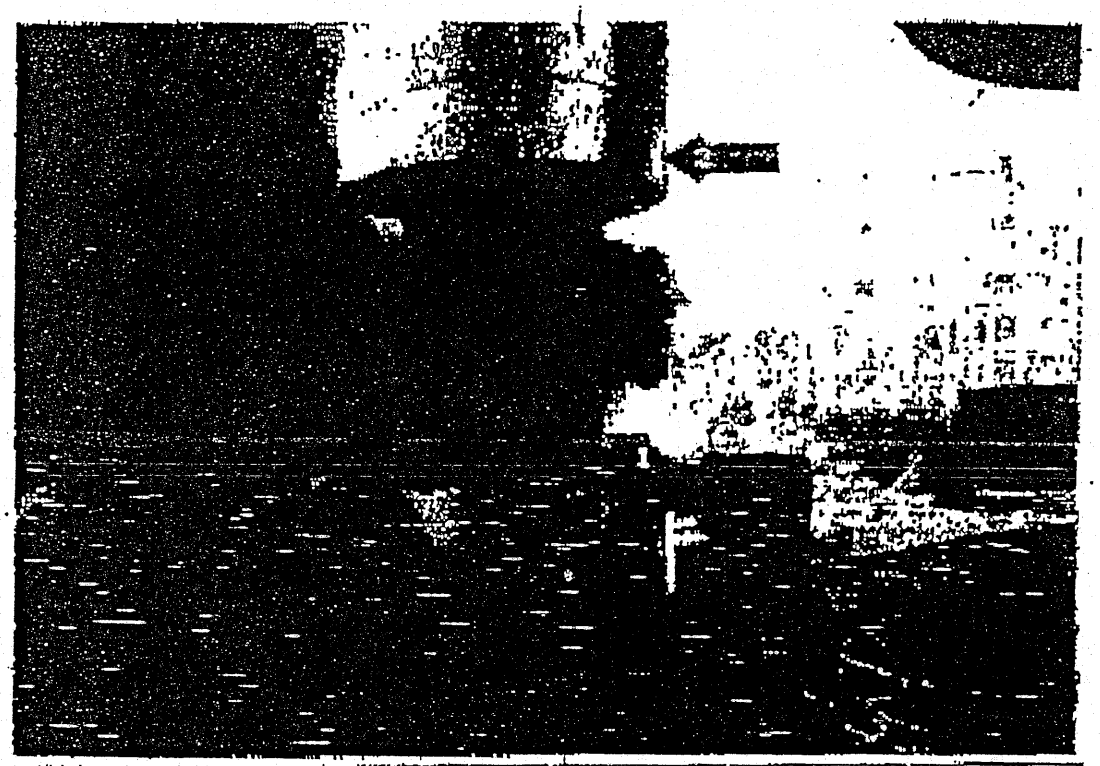

Figure 2. View of a bolted connection between the spool piece (Arrow 1) and an upstream length of pipe (Arrow 2). A gas leak occurred between the faces of the bolted flanges.

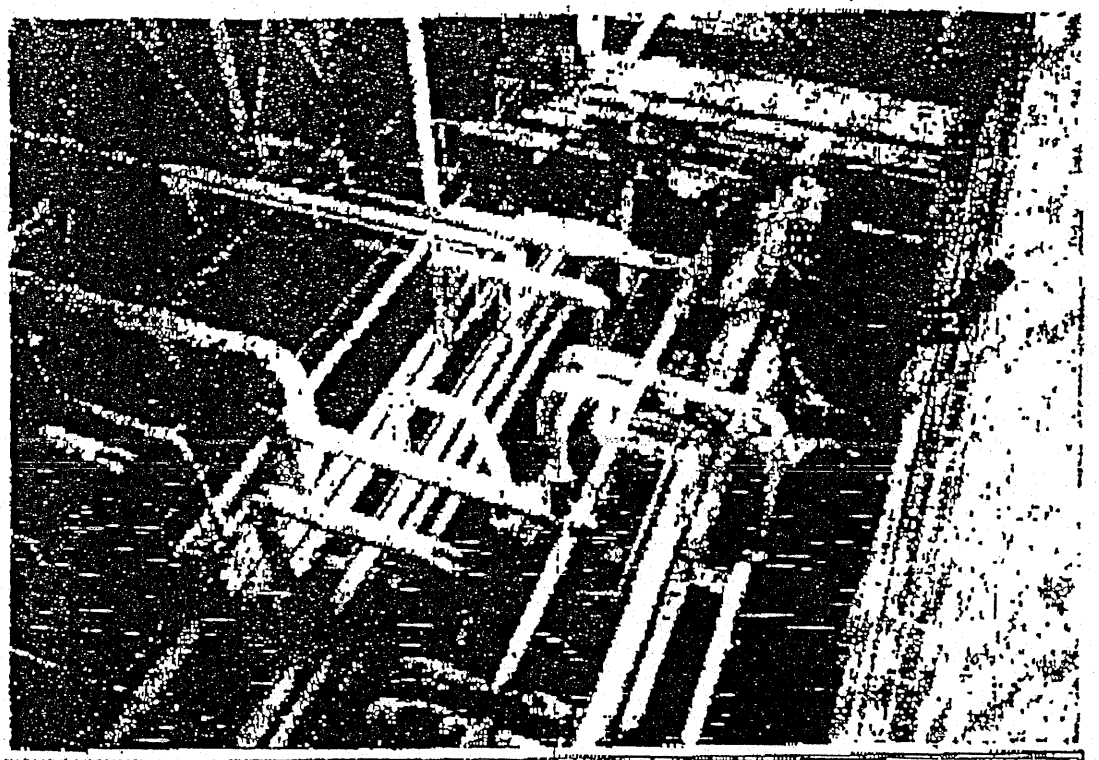

Figure 3. Overhead view of the fire scene. Arrow 1 indicates the remains of plastic sheets that were draped over horizontal pipes in the area. Arrow 2 indicates dehydrator D-102B.

Figure 4. View of the fire scene, as seen looking away from the leak location.

Figure 5 View of the fire scene after removal of burned pipes and components. The arrow indicates a combustible gas indicator detection point.

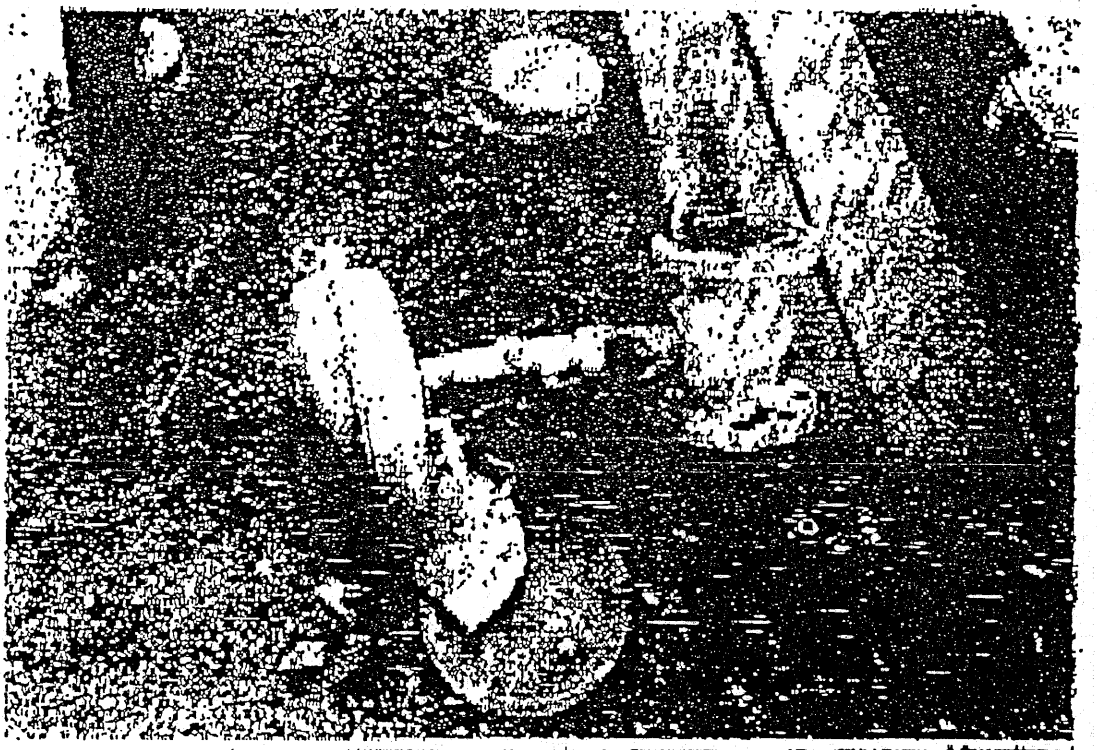

Figure 6. View of a solenoid controlled, pneumatically operated isolation valve that was reportedly in the direct line of the gas leak and flame.

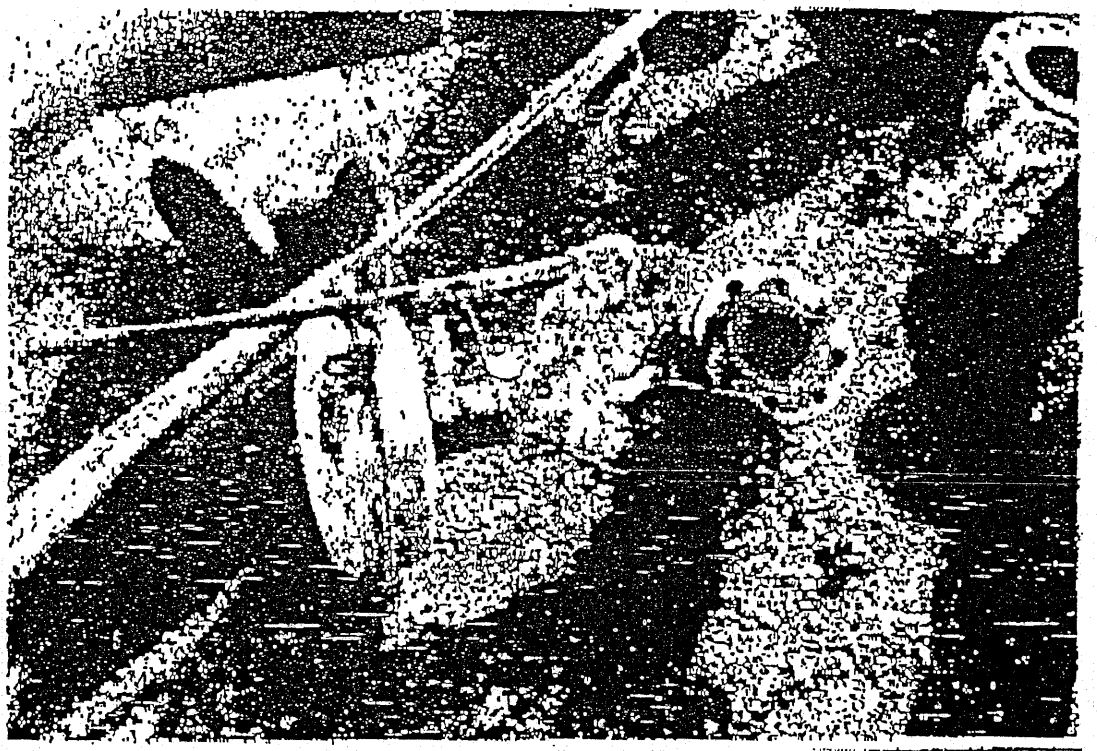

Figure 7. View of another solenoid controlled, pneumatically operated isolation valve that was removed from the fire scene. There were no indications of loose or exposed electrical connections or other items that could have ignited natural gas.

APPENDIX L

ALERT NOTICE
ALN-91-01

Alert Notice ALN-91-01

Date: 04/15/91
CFR Reference(s): 191.5; 195.52
Keyword(s): Accident, Report

Subject:
Reemphasize each pipeline operator's responsibility to report promptly; criteria specified in 49 CFR 191.5/195.52.

US Department of Transportation, 400 Seventh Street, SW.
Research and Special Programs Administration, Washington, DC 20590

PIPELINE SAFETY ALERT NOTICE

Alert Notice: ALN-91-01 Date: 04/15/91

To: Each Owner or Operator of a Gas or Hazardous Liquid Pipeline Facility and Every State Pipeline Safety Representative

Subject:

Purpose:
Recent experiences suggest a need to reemphasize the responsibility of each pipeline operator to report promptly, by telephone, pipeline incidents or accidents meeting the criteria specified in 49 CFR Sections 191.5 and 195.52. Failure to perform the required reporting may result in fines up to $10,000 a day, not to exceed a maximum of $500,000.

Notice:

Background:
Recent experiences suggest a need to reemphasize the responsibility of each pipeline operator to report promptly, by telephone, pipeline incidents or accidents meeting the criteria specified in 49 CFR Sections 191.5 and 195.52. Failure to perform the required reporting may result in fines up to $10,000 a day, not to exceed a maximum of $500,000.

Sections 191.5 and 195.52 require each operator to give direct telephonic notice to the National Response Center (NRC), telephone number 800-424-8802 (in Washington, DC, 202-426-2675), at the earliest practicable moment following discovery of certain types of events described therein, and

provide the required information. In most cases, this telephonic report can and should be made within 1-2 hours after discovery. This prompt notice is necessary in part for OPS and NTSB to make timely determination regarding the need for possible action.

A number of state agencies have identical or similar telephonic reporting requirements which are separate and in addition to the federal requirement. An operator's telephonic report to a state agency, with the state agency relaying the report to NRC, OPS, or NTSB, does not meet the requirements of the federal regulations. An operator must telephonically report any event subject to Section 191.5 or 195.52 directly to the NRC even though he also may be required to report the same incident to a state agency.

George W. Tenley, Jr., Associate Administrator, Office of Pipeline Safety

TITLE 49 CFR REFERENCES

§191.5 Telephonic notice of certain incidents.

(a) At the earliest practicable moment following discovery, each operator shall give notice in accordance with paragraph (b) of this section of each incident as defined in §191.3.
(b) Each notice required by paragraph (a) of this section shall be made by telephone to 800-424-8802(in Washington, DC, 267-2675) and shall include the following information:

(1) Names of operator and person making report and their telephone numbers.
(2) The location of the incident.
(3) The time of the incident.
(4) The number of fatalities and personal injuries, if any.
(5) All other significant facts that are known by the operator that are relevant to the cause of the incident or extent of the damages.

§193.2439 Emergency shutdown control systems.

(a) Each transfer system, vaporizer, liquefaction system, and storage system tank must be equipped with an emergency shutdown control system. The control must automatically actuate the shutdown of the component (providing pressure relief as necessary) when any of the following occurs:

(1) Temperatures of the component exceed the limits determined under §193.2105;
(2) Pressure outside the limits of the maximum and minimum design pressure;
(3) Liquid in receiving vessel reaches the design maximum liquid level;
(4) Gas concentrations in the area of the component exceed 40 percent of the lower flammable limit;
(5) A sudden excessive pressure change or other condition indicating a potentially dangerous condition; and,
(6) Presence of fire in area of component.

(b) For cargo transfer systems where all transfer operations are continuously manned and visually supervised by qualified personnel, actuation of the emergency shutdown control system may be manual after devices warn of the events listed in paragraph (a) of this section.
(c) Except for components that operate unattended and are remote from the control center, a reasonable delay may be programmed in emergency shutdown control systems required by this section between warning and automated shutdown to provide for manual response.

(d) Each LNG plant must have a shutdown control system to shut down all operations of the plant safely. The system must be operable at-

(1) The control center; and
(2) In the case of a plant where LNG facilities other than the control center are designed to operate unattended at the site of these facilities.

§193.2443 Fail-safe control.

Control systems for components must have a fail-safe design. A safe condition must be maintained until personnel take appropriate action either to reactivate the component served or to prevent a hazard from occurring.

§193.2509 Emergency procedures.

(a) Each operator shall determine the types and places of emergencies other than fires that may reasonably be expected to occur at an LNG plant due to operating malfunctions, structural collapse, personnel error, forces of nature, and activities adjacent to the plant.
(b) To adequately handle each type of emergency identified under paragraph (a) of this section and each fire emergency identified under §193.2817(a), each operator shall follow one or more manuals of written procedures. The procedures must provide for the following:

(1) Responding to controllable emergencies, including notifying personnel and using equipment appropriate for handling the emergency.
(2) Recognizing an uncontrollable emergency and taking action to minimize harm to the public and personnel, including prompt notification of appropriate local officials of the emergency and possible need for evacuation of the public in the vicinity of the LNG plant.
(3) Coordinating with appropriate local officials in preparation of an emergency evacuation plan, which sets forth the steps required to protect the public in the event of an emergency, including catastrophic failure of an LNG storage tank.

(4) Cooperating with appropriate local officials in evacuations and emergencies requiring mutual assistance and keeping these officials advised of:

(i) The LNG plant fire control equipment, its location, and quantity of units located throughout the plant;
(ii) Potential hazards at the plant, including fires;
(iii) Communication and emergency control capabilities at the LNG plant; and,
(iv) The status of each emergency.

§193.2607 Foreign material.

(a) The presence of foreign material, contaminants, or ice shall be avoided or controlled to maintain the operational safety of each component.
(b) LNG plant grounds must be free from rubbish, debris, and other material which present a fire hazard. Grass areas on the LNG plant grounds must be maintained in a manner that does not present a fire hazard.

APPENDIX N

CIVIL PENALTY SCHEDULE

CIVIL PENALTY SCHEDULE

In determining the civil penalty for each violation, the following state and federal statutes were considered, Tennessee Code Annotated, Section 65-28-108

"(a) Any person who violates any provision of §§ 65-28-104 -- 65-28-111, or of any regulation issued under such sections, is subject to a civil penalty not to exceed ten thousand dollars ($10,000) for each such violation for each day that such violation persists, except that the maximum civil penalty shall not exceed five hundred thousand dollars ($500,000) for any continuing series of violations.

(b) Any civil penalty may be compromised by the authority. In determining the amount of such penalty, or the amount agreed upon in compromise, the appropriateness of such penalty to the size of the business of the person charged, the gravity of the violation, and the good faith of the person charged in attempting to achieve compliance, after notification of a violation, shall be considered. The amount of such penalty, when finally determined, or the amount agreed upon in compromise, shall be paid within thirty (30) days after the determination to the authority, to be used for the purposes of §§ 65-28- 104 -- 65-28-111; and, if not paid within such time, may be recovered in a civil action brought by the authority in the chancery court of any county in which a violation exists.[Acts 1970, ch. 558, § 6; T.C.A., § 65-2809; Acts 1991, ch. 439, § 2; 1995, ch. 305, § 36.]"

The Pipeline Safety Act (Public Law 90-481; 49 U.S.C. § 1671 et seq.) addresses the federal statute pertaining to violations of the Minimum Federal Safety Standards, Section 60122 states:

"(a) GENERAL PENALTIES.

(1) A person who the Secretary of Transportation decides, after written notice and an opportunity for a hearing, has violated Section 60114(c) or 60118(a) of this title or a regulation prescribed or order issued under this chapter is liable to the United States Government for a civil penalty of not more than $25,000 for each violation. A separate violation occurs for each day the violation continues. The maximum civil penalty under this paragraph for a related series of violations is $500,000.

(2) A person violating a standard or order under Section 60103 or 60111 of this title is liable to the Government for a civil penalty of not more than $50,000 for each violation. A penalty under this paragraph may be imposed in addition to penalties imposed under paragraph (1) of this subsection.

(b) PENALTY CONSIDERATIONS.

In determining the amount of a civil penalty under this section, the Secretary shall consider –

(1) the nature, circumstances, and gravity of the violation;
(2) with respect to the violator, the degree of culpability, any history of prior violations, the ability to pay, and any effect on ability to continue doing business;
(3) good faith in attempting to comply; and,
(4) other matters that justice requires.

(c) COLLECTION AND COMPROMISE.

(1) The Secretary may request the Attorney General to bring a civil action in an appropriate district court of the United States to collect a civil penalty imposed under this section.
(2) The Secretary may compromise the amount of a civil penalty imposed under this section before referral to the Attorney General.

(d) SETOFF.

The Government may deduct the amount of a civil penalty imposed or compromised under this section from amounts it owes the person liable for the penalty.

(e) DEPOSIT IN TREASURY.

Amounts collected under this section shall be deposited in the Treasury as miscellaneous receipts.

(f) PROHIBITION ON MULTIPLE PENALTIES FOR SAME ACT.

Separate penalties for violating a regulation prescribed under this chapter and for violating an order under Section 60112 or 60118(b) of this title may not be imposed under this chapter if both violations are based on the same act."

In assessing the amount for the violation, we took into consideration the nature of the violation, the notices you have received from the Federal Office of Pipeline Safety and Tennessee Regulatory Authority in an Alert Notice and informational mailings concerning compliance with pipeline safety rules and regulations. An amount of $10,000 per violation was used in determining the civil penalty in accordance with TCA § 65-28-104. The violation amount was multiplied by the number of days the violation was outstanding times the size of the natural gas distribution system, and divided by the public safety factor. See the formula, public safety factor, length of time violation was outstanding and total amount for each violation listed below. In consideration of our state statute, the total civil penalty assessed is **$500,000**.

Formula

Civil Penalty Amount = Violation x Number of days x Size of natural gas distribution system / Public safety factor number

Public Safety Factor

Factor Number	Type of Violation
1.00	Priority 1 - Any violation which, if not immediately corrected, could present a hazardous condition to life, property or both.
2.0	Priority 2 - Any violation which needs prompt attention because the failure to correct could result in loss of service and / or reliability to the customer.
3.0	Priority 3 - Any violation which needs attention because the operator has failed to complete or schedule maintenance activities.

Factor Number	**Size of Natural Gas Distribution System**
.35	1 to 2,000 gas meters
.50	2,001 to 10,000 gas meters
.65	10,001 to 50,000 gas meters
1.0	50,000 or more

Chattanooga Gas Company

Liquefied Natural Gas Facility Incident

October 23, 2000

Violation	Formula			Maximum Civil Penalty
191.5	$\frac{\$10{,}000 \times 1 \times 1.0}{1}$	$\frac{10{,}000}{1}$	=	$ 10,000
193.2503	$\frac{\$10{,}000 \times 52 \times 1.0}{1}$	$\frac{520{,}000}{1}$		= $ 520,000
193.2603 (a)	$\frac{\$10{,}000 \times 52 \times 1.0}{1}$	$\frac{520{,}000}{1}$		= $ 520,000

Potential Maximum Civil Penalty = **$1,050,000**