TENNESSEE REGULATORY AUTHORITY

Sara Kyle, Chairman
Lynn Greer, Director
Melvin Malone, Director

460 James Robertson Parkway
Nashville, Tennessee 37243-0505

MEMORANDUM

To: David Waddell
Executive Secretary

From: Glynn Blanton, Chief
Gas Pipeline Safety Division

Date: May 9, 2002

Subject: Close Docket No. 01-00820
Chattanooga Gas Company LNG Incident – October 23, 2000
Report of Natural Gas Safety Inspection #00-319

I would like to request the attached Report of Natural Gas Safety Inspection #00-319 regarding our investigation of the incident that occurred on Chattanooga Gas Company's (CGC) LNG facility on October 23, 2000 be filed in Docket Number 01-00820 and the file be closed. The reason for closing the docket is due to US Department of Transportation Office of Pipeline Safety (OPS) letter dated March 22, 2002 stating that the CGC LNG facility is an interstate facility subject to federal jurisdiction under Chapter 601, of 49 United State Code of Federal Regulations, Part 193.

Prior to this determination, we have for twenty-eight years inspected this facility under the opinion the facility was an intrastate facility subject to the Authority's jurisdiction without objections from CGC or the Federal OPS. We have at OPS' request provided all records and documents pertaining to our previous natural gas safety inspections of the facility to the OPS Southern Regional Office in Atlanta, Georgia. If you have any questions pertaining to this request please advise.

c: Richard Collier
Tom Woosley
Earnest Burke
Brad Williams

TENNESSEE REGULATORY AUTHORITY

Sara Kyle, Chairman
Lynn Greer, Director
Melvin Malone, Director

460 James Robertson Parkway
Nashville, Tennessee 37243-0505

June 25, 2001
Overnight Delivery

Mr. Richard R. Lonn
Chief Engineer & Director - Regulatory Compliance
AGL Resources, Inc.
P.O. Box 4569
Atlanta, GA 30302-4569

Re: Formal Notice of Violations
Chattanooga Gas Company LNG Incident – October 23, 2000
Report of Natural Gas Safety Inspection #00-319

Dear Mr. Lonn:

On October 23, 2000, Chattanooga Gas Company in Chattanooga, Tennessee experienced a release of natural gas resulting in a substantial fire and an emergency shutdown. Under the Minimum Federal Safety Standards (MFSS), a release of natural gas and emergency shutdown of an LNG facility is considered an "incident" and reportable to the Federal Office of Pipeline Safety and the state agency enforcing the MFSS. This incident was investigated by the Tennessee Regulatory Authority (TRA) in accordance with Tennessee Code Annotated (TCA) Section 65-28-106 and Section 60105 (c) (B) of the Natural Gas Safety Act to determine the cause and circumstance of the incident.

As a result of our on-site inspection and extensive investigation, the Gas Pipeline Safety Division has determined that Chattanooga Gas Company (CGC) has committed three series of violations as specified in the attached October 23, 2000 LNG Facility Incident Report. Pursuant to TCA Section 65-28-108 (a), CGC is subject to a civil penalty not to exceed ten thousand dollars ($10,000) per day for each violation during the duration of the violation. Considering the cause and circumstances of the incident as determined by our investigation, Chattanooga Gas Company is hereby assessed a civil penalty of **$500,000**. The Civil Penalty Schedule included in the report sets forth the basis for determining the amount of the civil penalty for each violation.

In accordance with TRA Rule 1220-4-5-. 47 (5) & (6), a written response from CGC is to be submitted to the Pipeline Safety Chief within thirty (30) days of receipt of this Formal Notice of Violations. Your response options to this requirement are:

1. Submit a written statement to the Pipeline Safety Chief indicating that corrective measures have achieved compliance;

2. Submit a written plan of action to the Pipeline Safety Chief outlining the corrective measures that will be taken to achieve compliance and when compliance is anticipated; or

3. Request an informal conference with the Pipeline Safety Chief to discuss the violation(s).

If you have any questions regarding this matter or wish to schedule an informal conference during the week of July 2, 2001, please call me at 800.342.8359 extension 185. Thank you for your cooperation and attention in matters relating to gas pipeline safety.

Sincerely,

Glynn Blanton, Chief
Gas Pipeline Safety Division

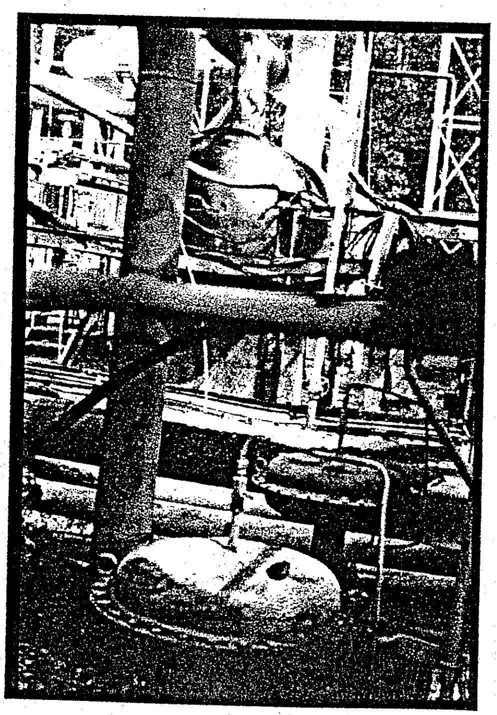
GB/vln

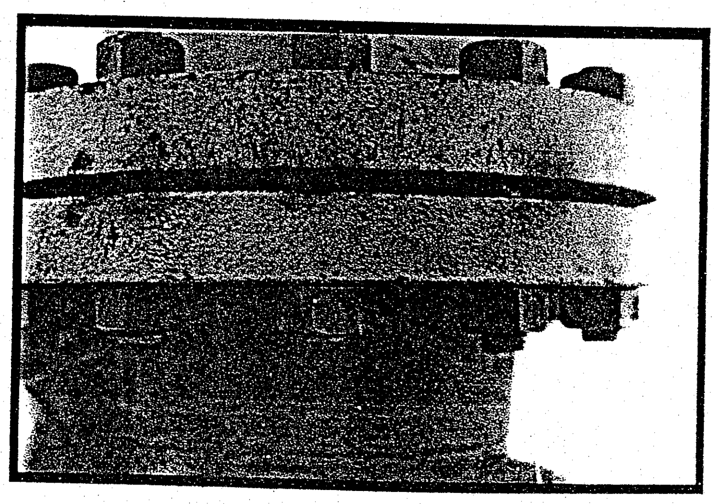
Attachment-October 23, 2000 LNG Facility Incident Report

TENNESSEE REGULATORY AUTHORITY

OCTOBER 23, 2000 LNG FACILITY INCIDENT REPORT

CHATTANOOA GAS COMPANY
CHATTANOOGA, TN





REPORT OF NATURAL GAS SAFETY INSPECTION #00-319

CHATTANOOGA GAS COMPANY
OCTOBER 23, 2000 LNG FACILITY INCIDENT REPORT
CHATTANOOGA, TENNESSEE

INTRODUCTION

At approximately 7:20 PM EDT on October 23, 2000, a release of natural gas occurred in the liquefied natural gas facilities operated by Chattanooga Gas Company[1], 3401 North Hawthorne Street, Chattanooga, Tennessee. The release resulted in a fire and subsequent emergency shutdown of the LNG facilities. The Chattanooga Fire Department responded and assisted in extinguishing the fire and cooling down nearby vessels. Plant piping, valves, insulation, and wiring were damaged as a result of the fire. The damaged wiring caused a loss of electrical power and telephone communications. Operator contacted the National Response Center (NRC) by telephone at 1:00 AM EDT on October 24, 2000 (See Appendix A, NRC report # 546070). The TRA was then called at 1:05 AM EDT and notified of the incident through a voice message left for the Gas Pipeline Safety Division. An additional message was left on the home answering machine of Mr. Glynn Blanton, Chief of TRA Gas Pipeline Safety Division, at 1:15 AM EDT. Initial estimates of damage in this incident were between $750,000 and $1,500,000.

This pipeline incident was investigated by the Tennessee Regulatory Authority (TRA) under authority of Tennessee Code Annotated § 65-28-106, by which TRA representatives are authorized to inspect all pipeline systems, facilities and equipment and have the right of access and entry to all buildings and property owned, leased or operated by such systems. Furthermore, the TRA is authorized to enforce federal safety standards as set forth in the Natural Gas Pipeline Safety Act of 1968 and to exercise regulatory jurisdiction over the safety of pipeline systems and transportation of gas in accordance with authority provided by the Natural Gas Pipeline Safety Act of 1968.

BRIEF CHRONOLOGY[2]

Chattanooga Gas Company (CGC) was in the process of completing substantial upgrades to the LNG facilities at the time of the incident. Process piping was being sandblasted, painted, and insulated where necessary. During these activities, the plant was operating in the liquefaction mode in preparation for the heating season. At approximately 7:00

[1] Atlanta Gas Light Company (AGL) is the parent company of Chattanooga Gas Company.
[2] For a complete chronology of events, see Appendix B, "Chattanooga LNG Plant – Fire Chronology"

AM on the day of this incident, contractor personnel in the area of the dehydrators performed abrasive sandblasting. During the sandblasting, process piping that had already been painted or insulated was covered with canvas and plastic tarps. These tarps were to provide protection from the abrasive sandblasting material and paint over-spray. At approximately 1:30 PM, clean up and preparations for priming at the dehydrators were begun. At approximately 3:00 PM application of primer was completed, painting equipment was cleaned, and contractor personnel left for the day. The protective tarps were left in place (See Appendix C, photographs 1-5).

Mr. Joel Paris was the Chattanooga LNG plant operator on duty on the evening of October 23. At 7:20 PM, Mr. Paris heard a loud noise and upon investigation determined that there was a fire in the plant pretreatment area. Mr. Paris placed a telephone call to 911 for emergency assistance at 7:22 PM and activated the plant Emergency Shutdown (ESD) system. Mr. Chris Young, Chattanooga LNG plant supervisor, and Norman Jernigan, Chattanooga LNG plant operator, were contacted for assistance. Mr. Jernigan also notified Chattanooga LNG plant operators, Mr. Robert McCain and Mr. Terry Poss, of the incident. Chattanooga fire department personnel arrived at 7:25 PM, but would not enter the plant gate until their hazardous materials team arrived. Plant personnel stated during interviews that approximately 10 minutes after the fire was discovered an explosion was heard and the fire increased in intensity. At 7:35 PM, Mr. Young contacted Gary Northrup, AGL LNG Technology Manager, to notify him of the fire. He explained that he would assess the situation upon arrival and relay the status to Mr. Northrup. Fire department personnel notified area businesses and residents to stay inside; evacuation was considered but determined not to be necessary. At 7:39 PM plant power and telephone communications were lost. The Hazardous Materials team and Mr. McCain arrived at 7:40 PM. Mr. Young arrived at 7:50 PM but was detained at the fire department roadblock.

Fire department personnel proceeded beyond the roadblock to make an assessment and then entered the plant at 8:07 PM accompanied by Mr. McCain. At this time Mr. Paris manually closed the plant inlet valve, then attempted to extinguish the fire with the control room monitor. Initially, water pressure was low and there was insufficient flow from the monitor to extinguish the fire. Chattanooga fire department was able to contact the Tennessee American Water Company requesting an increase in pressure, then began to cool down plant vessels. At 8:13 PM the fire was extinguished and personnel continued to cool down vessels for an additional hour and a half. At 8:25 PM, Mr. Young was allowed to enter the plant and assumed his supervisory role over plant employees and liaison with the Chattanooga Fire Department. After assessing the situation, Mr. Young contacted Mr. Northrup to provide an update on the incident. Mr. Northrup contacted additional AGL personnel to advise of the incident status, then drove from his home in Georgia, approximately 2 hours to the Chattanooga plant site. Mr. Northrup arrived at the plant site at 12:00 AM, evaluated the extent of damage, and determined that this was a reportable incident. Calls were then placed to the National

Response Center, Tennessee Regulatory Authority and the home of Mr. Blanton. Contractor personnel were then contacted to begin emergency repairs.

INVESTIGATION AND ANALYSIS

Earnest Burke and Tom Woosley, representatives of the TRA, arrived at the incident site at approximately 11:00 AM, October 24, 2000. The investigation consisted of examination and photography of the damaged plant area, review of plant emergency procedures, and interviews with plant personnel. Additional documentation was provided by AGL, as it became available. Mr. Young accompanied TRA personnel during the on site inspection (See Appendices D-G).

The heat-affected area extended from the pretreatment area, across process piping and wire trays, to the mixed refrigerant loop (MRL) tank (See Appendix C). Piping in the process area had been burned clean of its insulation and showed evidence of exposure to extreme temperatures. The surface beneath the piping was covered with the charred remains of the insulating material. The remnants of burned canvas tarps and melted plastic tarps were draped over horizontal piping along the perimeter of the affected area (Appendix C photographs 3-7). These remnants were still held in place by wire, tied to the piping. Wire trays and the wire they contained were severely damaged by the heat (Appendix C photographs 21-25). Approximately 20 feet of one wire tray and the wire that it contained were totally consumed by the fire. Control valves, located within the heat-affected area, also appeared to be damaged by heat (Appendix C, photographs 18-21). The heat-affected area appeared to originate from a flange assembly in piping downstream of dehydrator B (Appendix C, photographs 10-14). It was not immediately apparent without disassembly, but there appeared to be a section of gasket material missing from the assembly. Mr. Young indicated that the flames had originated from this area. A section of vertical piping located a few feet from the flange exhibited a bulged area and "fish mouth" shaped opening (Appendix C, photographs 14-17). Heat damaged electrical conduit was also observed near this piping.

After examining the plant damage, a review of the emergency manual was conducted and a copy obtained for further reference (Appendix D). The emergency manual is consistent with 49 CFR § 191.3 in defining "incident" and § 191.5 for telephonic notice requirements. Copies were also obtained of emergency procedure excerpts, which were posted on the control room bulletin board. These excerpts describe procedures to be followed for specific events: "Fire In Process Area," "LNG Spill," and "Brush Fire Away From Process Area." (Appendix E).

A discussion with Mr. Young and Mr. McCain provided additional information regarding operating conditions at the time of the incident. The pretreatment dehydrators were undergoing a bed shift at the time the incident occurred. Plant records indicate that

during the bed shift, gas flowed from the regenerator gas heater to the regenerators at a temperature of 550°F (Appendix F). Operating pressure at the time of the incident was 230 psig.
During July 2000, the flange assembly had been disassembled and blind flanged while the dehydrator was filled with molecular sieve material. After this operation was completed, the piping and flange assembly was reassembled. New gaskets made from BF Goodrich Garlock 3510 material were installed during this procedure. A leakage test was performed and no leaks were indicated during the test.

The emergency shut down of the plant was initiated manually rather than by the automatic safety devices installed for such purpose. Gas detectors were operational; however, fire detectors were set on bypass mode due to several previous erroneous alarms. Our investigation determined that these detectors had been left on bypass for an extended period of time.

The action of the Chattanooga Fire Department must also be questioned. Although fire department personnel arrived within the first few minutes, they did not enter the plant for an additional 47 minutes. Mr. Young stated that it had been an extended period of time since any type of liaison meeting had been held with the fire department and this lack of communication resulted in the fire department's hesitation, which in turn protracted the duration of the incident.

On November 29, 2000, Mr. Glynn Blanton, Chief of Gas Pipeline Safety, and Mr. Woosley visited the LNG plant following an inspection of the Chattanooga distribution system. The gasket, which was suspected to have blown out, was available for viewing at this time. Approximately one quarter of the gasket circumference was missing, confirming that the gasket had indeed blown out (See Appendix G photos). It was learned that the flange assembly held a strainer, commonly referred to as a "witch's hat", in place. The strainer is conical in shape and has a "brim" at the open end thereby resembling a witch's hat. Compressive forces on the brim by the flanges held the strainer assembly in place. Inspection by plant personnel after removal, revealed that a triangular shaped piece was missing from the brim in the same area where the gasket had blown out. Cracks were also found in other locations along the circumference of the brim. After discovery of the cracks, other strainers were removed for inspection. These strainers also exhibited cracks in the brim. CGC submitted the strainer from dehydrator B, the piping section with the fish mouth rupture, and a section of electrical conduit to Applied Technical Services, Incorporated for analysis. The purpose of this analysis was to determine if failure of these items occurred prior to or was a result of the fire.

Subsequent to November 29, 2000, the Pipeline Safety Division continued its investigation by gathering additional information on repair work and installation of new equipment. Most of this information was provided by Atlanta Gas Light officials. Documents were reviewed by Gas Pipeline Safety members and comments were forwarded to officials of Atlanta Gas Light. During this time, the Pipeline Safety Division also obtained the analysis results from Applied Technical Services, Incorporated. A copy of the results of this analysis is included with this report (See Appendix H).

The Pipeline Safety Division sent a formal request for additional data on April 5, 2001 to Chattanooga Gas Company (See Appendix I) for the purpose of obtaining information relative to the times and dates certain plant functions were conducted and clarification pertaining to the operational mode of the UV detectors. The response from Chattanooga Gas Company, dated April 12, 2001, is included in Appendix I. This information provided a better understanding of the regeneration cycles for the dehydrator units. During the heating and cooling cycles, gas flows into the dehydrators at the bottom connection, and out through the top connection. During the heating cycle gas flows from the regeneration gas heater to dehydrator units through insulated piping. Heat loss between the regeneration gas heater and the dehydrator unit would be minimal, therefore, gas flowing through the piping and the flange where the failure occurred would be at or very near the temperature of the gas leaving the heater. Manufacturer's information pertaining to the subject gasket material states that when system operating temperature approaches the maximum continuous temperature rating for the material, an upgrade to a superior material is suggested. The operating temperature of the system exceeded the temperature rating of the gasket material and this may have been the root cause of the failure at the flange.

Mr. Brad Williams of the Gas Pipeline Safety Division conducted an additional inspection of the LNG facilities on May 3 and 4, 2001. The purpose of this inspection was to obtain additional information regarding plant operation and upgrade activities conducted prior to the incident. Mr. Williams inquired specifically about the operational mode of the UV detectors at the time of the incident. Mr. Young indicated that the detectors were operational but were in a bypass mode. In this mode, visual and audible alarms were still provided but the emergency shutdown system would not be activated in the event a fire was detected. Mr. Young explained that this practice had been followed when the plant was in liquefaction mode so that erroneous alarms would not shut down the plant. A review of plant written procedures reveals that the UV detectors were to be placed in bypass mode only during scheduled fires or when welding was performed. A copy of Mr. Williams' report is provided as Appendix J to this report.

CONCLUSIONS

The operating conditions at the time of the incident appear to be a factor in the failure of the gasket. Garlock 3510 gasket material is rated for a pressure of 1200 psig, well above the operating pressure at the time of the incident. This gasket material, however, is rated for a maximum temperature of 500 °F. Operating records reveal that for the 12 hours prior to the incident, the operating temperature during heating cycles was 550 °F. Operating the system during this time and on previous occasions at these excessive operating temperatures likely contributed if not caused the weakening of the gasket material. These operating temperatures could also cause thermally induced "stretching" of the flange bolts, thereby reducing the compressive force of the flanges against the gasket and witch's hat brim. These factors could in turn cause the failure of the gasket and the ejection of the broken section of the witch's hat by the internal pressure.

The flange assembly at the outlet of dehydrator B appears to be the point of origin of the initial gas leakage. The fish mouth rupture in the vertical piping, approximately five (5) feet away, confirms this finding. Ignited gas, escaping from the flange, heated the nearby vertical piping causing the steel to weaken. As the weakening occurred, internal pressure caused the material to bulge outward. As the material stretched outward, it became thinner. The material was weakened to a point where internal pressures could not be contained. The piping ruptured resulting in the formation of the fish mouth shaped opening. Gas escaping from this opening caused the explosion, which was heard approximately 10 minutes after the initial fire was discovered.

While no ignition source was conclusively identified following this incident, several possibilities are theorized:

1) **Electrical Spark:** The electrical conduit located near the flange had contained 125-Volt DC control wiring for process valves. This conduit appeared to have been in the direct path of the escaping gas. If the escaping gas or another foreign object exerted enough force on the conduit causing it and the wiring to deteriorate, a spark could be generated. The 125-Volt circuit provides more than enough energy to ignite the natural gas.

2) **Frictional Spark:** The missing section from the brim of the witch's hat was likely ejected from the flange at a high velocity. If this projectile struck another object, such as piping or conduit, a spark could be generated with sufficient energy to ignite natural gas. McGriff, Seibels & Williams, Inc., insurance brokers representing Atlanta Gas Light Company, requested an investigation of the fire by Engineering Design & Testing Corporation (ED&T). The attached investigative report from ED&T suggests that ignition was concurrent with leak initiation (Appendix K). The report also indicates that the most likely source was a friction spark created when the section of the witch's hat was ejected from the flange assembly. While this is not impossible, it is highly unlikely. Natural gas has a flammable range of 4-15% natural gas in air. A spark generated at the origin of the gas leakage would not cause ignition because the mixture would be approximately 100% gas and therefore too rich to ignite. The ignition source would have to be some distance away from the origin of the escaping gas so that sufficient mixing with air would present a flammable mixture.

3) **Static Electricity:** Numerous natural gas fires are reported each year due to static electricity generated when natural gas flows from polyethylene piping at high velocities. The flow of gas from the flange, in close proximity to the plastic tarps, could have caused static charges to build up to sufficient voltage to cause a spark, thereby igniting the gas.

4) **Other Electrical Sources:** Electrical equipment in the vicinity of the escaping gas could have provided an ignition source. Nearby process valves are pneumatically controlled by solenoid valves. Typically, there are no local arcing contacts in controls of this type, but poor insulation or a broken wire could cause sparking and serve as an ignition source. The electrical conduit and conduit fittings utilized throughout the plant facilities are not in compliance with the requirements of the National Electrical Code with respect to hazardous environments. Flexible conduit was used where rigid conduit is required. Standard surface cover fittings were used in place of explosion proof fittings. Conduit seals were not utilized at locations that require them. Any of these factors could present numerous potential ignition sources.

VIOLATIONS

§ 191.5 – An event that results in emergency shutdown of a LNG facility must be reported at the first practical moment. Emergency shutdown of the Chattanooga LNG plant was initiated at 7:22 PM and became a reportable incident at that time. The Federal Department of Transportation has provided, in an Alert Notice dated April 15, 1991, that notification should be provided within 2 hours of discovery of the incident (See Appendix L). The Gas Pipeline Safety Division has reminded each operator of this requirement through mailings and presentations at industry meetings. The fire was extinguished at 8:13 PM and an "all clear" was issued at 9:50 PM. Plant personnel were able to communicate with emergency agencies and AGL personnel during this time but failed to notify the Emergency Response Center and the TRA until 1:00 AM after Mr. Northrup arrived at the plant. **The time that elapsed from initiation of the emergency shutdown to notification of the emergency response center was not acceptable; therefore operator is cited for violation of § 191.5.**

§ 193.2503 – "Each operator shall follow one or more manuals of written procedures to provide safety in normal operation and in responding to an abnormal operation that would affect safety." Operator has a written procedure that requires ultraviolet detectors to be operated in "Normal" mode except in the event of approved fires or welding. Personnel at the plant have established a "practice" of placing the detectors in "Bypass" mode when the plant is undergoing liquefaction. **This practice is not consistent with operator's written procedures; therefore operator is cited for violation of § 193.2503.**

§ 193.2603 – Components of LNG plants must be maintained in a condition compatible with its operational or safety purpose by repair, replacement, or other means. Gasket material, installed in the flange where the failure occurred, was rated for a maximum continuous operating temperature of 500°F. Operator records indicate that prior to the incident, operating temperature exceeded this rating. The manufacturer recommends an upgrade to a superior material when the operating temperature *approaches* the gasket material's maximum continuous temperature limit. **The gasket material was not compatible with its operational purpose; therefore operator is cited for violation of § 193.2603.**

ADDITIONAL CONCERNS

In addition to the above-mentioned violations determined as contributing to the flange failure and resulting fire, the following are additional concerns that have arisen during the course of our investigations:

1. Upgrades of UV Detectors

The Chattanooga Gas LNG facility was equipped in the original construction with UV detectors which were capable of activating the emergency shutdown system. Minimum Federal Safety Standards, 49 CFR, Part 193 require this for plants built after the effective date of the regulation. This requirement is not retroactive; however the safety benefits of this system should be utilized. While unnecessary shutdowns of the plant are understandably a nuisance, this problem should have been recognized years ago and corrected. Fire protection equipment, combining both ultraviolet and infrared detection (UV/IR), has been available for several years and is much less likely to activate false alarms and shutdowns. The risk of harm to neighboring businesses and residences presented by fires at LNG facilities dictate the use of appropriate fire detection and fire fighting equipment. This was apparently recognized when UV detectors were incorporated in the emergency shutdown system in the original plant design. It is strongly recommended that this equipment be updated and utilized at all times with the exceptions of permissible fires and welding.

2. Potentially Hazardous Conditions in the Vicinity of Hydrators

During the sandblasting and painting activities, tarps were used to protect piping, limit dust, and prevent over-spray in the work area. These tarps were left in place overnight and added additional fuel to the fire in this incident. Tarps in the area where the incident occurred were plastic and may have possibly served as an ignition source through generation of a static electric spark. Part 193 of the Minimum Federal Safety Standards requires that plant grounds be free from rubbish, debris, and other materials that present fire hazards. With this in mind, tarps could also be considered fire hazards and their use should be limited to the hours the contractor personnel are present. It would have been better yet for these activities to be scheduled during a plant shutdown to further limit potential safety hazards.

3. **Lack of Coordination between Chattanooga Fire Department and Chattanooga Gas Company Personnel**

The response of the Chattanooga Fire Department during the emergency poses an additional concern. CGC LNG Plant personnel were detained from entering the gate and performing their assigned fire control duties. It is imperative that liaison be established with emergency personnel so that the fire department is aware of the fire control capabilities of plant personnel and assistance that may be required in emergency situations. Documentation indicates that a meeting was held with Captain Adams of the Chattanooga Fire Department on June 20, 2000. Mr. Young stated that this was a very general discussion which focused primarily on the upgrades being performed at the plant. It is recommended that liaison meetings be held with all area emergency personnel who may be involved in plant emergencies. This may include fire, police, sheriff, EMS, or other local emergency responders. Responsibilities for traffic control, evacuations, first aid, and fire control should be discussed so that all involved agencies are familiar with their individual responsibilities.

4. **Use of Unsuitable or Substandard Replacement Parts**

A final concern pertains to the use of a gasket material that was not compatible with process temperatures. It is imperative that any replacement parts, materials, or components be suitable for their intended use. Use of unsuitable or substandard components can result in unnecessary shutdowns, product loss, or personal injury. This point should be emphasized with all CGC LNG maintenance personnel.

The Pipeline Safety Division will not take formal action in regard to these additional concerns. However, if Chattanooga Gas Company does not take proper steps to correct these items, they may serve as a basis for further investigation and resulting penalties.

APPENDICES

INDEX

APPENDIX A

NRC INCIDENT REPORT #546070

U. S. Department of Transportation
Research and Special Programs Administration
400 Seventh Street, S.W.
Washington, DC 20590

OFFICE OF PIPELINE SAFETY
FAX COVER SHEET

Our Fax Number...(202) 366-4566

DATE: 10-24-00

TIME: 11:50am EDT

TO	Southern Region	FROM	OPS - HQ
	ATTN: Bennie Andrews		James Reynolds
FAX #	404-562-3569	FAX #	202-366-4566
PHONE #	404-562-3530	PHONE #	202-366-2786

Subject: NRC Rpt # 546070 - ChaTTANooga TN.

No. of Pages 4 (includes fax transmittal sheet)
(Please call if you do not receive all pages.)

Office of Pipeline Safety
MISSION:
"To protect the people and the environment of the United States through a comprehensive pipeline safety program that includes effective risk management, thorough pipeline compliance, high quality training, and a strong, balanced Federal/State partnership."

G. BIANTON FYI

NATIONAL RESPONSE CENTER - FLASH FAX
xxxGOVERNMENT USE ONLYxxxGOVERNMENT USE ONLYxxx
DO NOT RELEASE this information to the public without
permission from the NATIONAL RESPONSE CENTER 1-800-424-8802

Incident Report # 546070

INCIDENT DESCRIPTION

xReport taken by: MST3 LORECK at 00:40 on 24-OCT-00
Incident Type: PIPELINE
Incident Cause: UNKNOWN
Affected Area:
The incident occurred on 23-OCT-00 at 19:22 local time.
Affected Medium: AIR

REPORTING PARTY

Name: GARY NORTHRUP
Organization: ATLANTA GAS LIGHT COMPANY
Address: 3401 NORTH HAWTHORNE STREET
CHATANOOGA, TN 37406
ATLANTA GAS LIGHT COMPANY called for the responsible party.
PRIMARY Phone: (423)6244843
Type of Organization: PUBLIC UTILITY

SUSPECTED RESPONSIBLE PARTY

Name: GARY NORTHRUP
Organization: ATLANTA GAS LIGHT COMPANY
Address: 3401 NORTH HAWTHORNE STREET
CHATANOOGA, TN 37406
PRIMARY Phone: (423)6244843
Type of Organization: PUBLIC UTILITY

INCIDENT LOCATION

3401 NORTH HAWTHORNE STREET County: HAMILTON
CHATANOOGA, TN 37406

RELEASED MATERIAL(S)

CHRIS Code: ONG Official Material Name: NATURAL GAS
Also Known As:
Qty Released: 0 UNKNOWN AMOUNT

DESCRIPTION OF INCIDENT

THE MATERIAL RELEASED FROM A PIPELINE DUE TO UNKNOWN CAUSES.

INCIDENT DETAILS

Pipeline Type: OTHER
DOT Regulated: YES
Pipeline Above/Below Ground: ABOVE
Exposed or Under Water: NO
Pipeline Covered: UNKNOWN

DAMAGES

Fire Involved: YES Fire Extinguished: YES
INJURIES: Hospitalized: Empl/Crew: Passenger:
FATALITIES: Empl/Crew: Passenger: Occupant:

EVACUATIONS:0 Who Evacuated:PRIVATE CITIZENS Radius/Area:
Damages:

Closure Type	Description of Closure	Hours Closed	Direction of Closure
Air:	N		
Road:	N		
Waterway:	N		Major Artery:N
Track:	N		

Media Interest: NONE Community Impact due to Material: NO

REMEDIAL ACTIONS

PLANT WAS SEALED OFF
Release Secured: YES
Release Rate:
Estimated Release Duration: 1 HOUR

WEATHER

ADDITIONAL AGENCIES NOTIFIED

Federal:
State/Local:
State/Local On Scene:
State Agency Number:

NOTIFICATIONS BY NRC

AGCY TOXIC SUBST & DISEASE REGISTR	
CHEM SAFETY AND HAZARD INVEST BOAR	(404)6396360
EPA OFFICE OF EMERG RESPONSE(OERR)	(202)2617600
U.S. EPA IV	(703)9675012
FEDERAL EMERGENCY MANAGEMENT AGENC	(404)5628700
NIPC WATCH & WARNING UNIT	(202)8986100
NOAA 1ST CLASS BB RPTS FOR TN	(202)3233204
24-OCT-00 00:49	
NATIONAL RESPONSE CENTER HQ	(206)5266344
NTSB PIPELINE	(202)2672100
DOI FOR REGION 4 ATTN: MR. HOGUE	(202)3146293
24-OCT-00 00:49	
RSPA OFFICE OF PIPELINE SAFETY	(404)3314524
GEORGIA EMERGENCY MNGMT AGENCY	
24-OCT-00 00:49	
TN EMERGENCY RESPONSE	(404)6357200
24-OCT-00 00:49	
	(615)7410001

ADDITIONAL INFORMATION

THE CALLER DID NOT KNOW THE NUMBER OF PEOPLE EVACUATED. THE PEOPLE ARE BACK IN THE HOUSES NOW. PIPELINE SAFETY WILL BE NOTIFIED.

---

xxx END INCIDENT REPORT 546070 xxx

Report any problems or Fax number changes by calling 1-800-424-8802

PLEASE VISIT OUR WEB SITE AT http://www.nrc.uscg.mil

TOTAL P.04

APPENDIX B

CHATTANOOGA LNG PLANT – FIRE CHRONOLOGY

AGL Resources Inc.

P.O. Box 4569
Atlanta, Georgia 30302-4569
Telephone (404) 584-9470

November 22, 2000

Tennessee Regulatory Authority
Gas Pipeline Safety Office
460 James Robertson Parkway
Nashville, Tennessee 37243-0505

Attention: Mr. Glynn Blanton
Chief, Gas Pipeline Safety Division

Dear Mr. Blanton:

The following information is provided as a follow-up to the initial report dated November 6, 2000, surrounding the incident at Chattanooga Gas Company's (CGC) Liquefied Natural Gas (LNG) facility on October 23, 2000.

Attachment A, "Chattanooga LNG Plant – Fire Chronology," presents a more detailed timeline of events surrounding the incident. Also, please refer to my report dated November 6, 2000, for a summary of the various notifications that were made.

Based on preliminary laboratory results of the equipment from the site, it appears that the fire was caused by a leak at a flanged connection in the pretreatment area. Indications are that a section of the brim on the "witch's hat" strainer failed due to metal fatigue allowing high-pressure gas to escape. The source of ignition, while not determined with absolute certainty, is believed to be due to an electrical spark caused when the force of the escaping gas damaged the conduit runs. The lab report indicates that metal fatigue cracks in the strainer appear to have been present prior to the incident. Since these strainers require no preventive maintenance, CGC had no way of knowing that these cracks were present. Results also indicate that the damaged conduits and pipes failed as a result of the fire. Attachments B and C are photographs of the witch's hat that clearly show the failed section. Also we have added Attachment D, which is a series of photographs that show the fire damaged areas of the LNG plant, including one that depicts the witch's hat in its original location.

CGC is working diligently on returning the vaporization and liquefaction systems to operational status. The repairs to the vaporization system are expected to be completed on December 4, 2000, and repairs to the liquefaction system will be completed in February 2001. In the meantime, LNG from Atlanta Gas Light Company's (AGLC's) Cherokee and Riverdale, GA facilities will be transported to Chattanooga. The shipments are due to commence on November 27, 2000. In addition, to supplement the supply, we are attempting to contract with a LNG plant in Trussville, AL. The plant should be at its full storage capacity of 1.2 bcf by February 2001. CGC is committed to taking whatever steps are necessary to ensure an adequate supply of gas to its firm customers during the upcoming winter heating season.

If you have any questions concerning this matter, or if I may provide you with any additional assistance, please let me know.

Sincerely,

Richard R. Lonn
Chief Engineer and Director
Regulatory Compliance

Attachments

cc: Information Resource Manager
Office of Pipeline Safety
400 Seventh Street, S.W.
Washington, D.C. 20590

Mr. Robert Arvedlund
Director, Division of Environmental and Engineering Review
Office of Pipeline Regulation
Federal Energy Regulatory Commission
Washington, D.C. 20426

Ms. P. Rosput
Mr. R. Duszynski
Mr. C. Preble
Mr. I. Blythers
Mr. J. Scabareti
Ms. S. Sitherwood
Mr. B. Batson
Mr. L. Buie
Mr. S. Lindsey
Mr. R. McCollum
Mr. R. Rogers
E. Stanek
P. Wagner
K. Wolff

Attachment A

Chattanooga LNG Plant - Fire Chronology

Date	Time	What Occurred
10.23.00	7:00 AM	Painters, Pro Coat, started shift abrasive blasting at dehydrators, Delashmitt working from JLG lift abrasive blasting far West tank @ Barrel ladder. John Cagler abrasive blasting @ bottom ring (lowest 8 feet), Spangler tending to equipment South of dehydrators, Hampton doing cover up work East of dehydrators at bridge. This work went on until 1:00 pm.
	8.00 AM	Insulators were working in the sendout area.
	9:00 PM	Plant is in liquefaction and running normally. Readings for dehydrators are on sheet 2. Equipment operational readings are available on hard copy.
	10:00 AM	Plant is in liquefaction and running normally. Readings for dehydrators are on sheet 2. Equipment operational readings are available on hard copy.
	11:00 AM	Plant is in liquefaction and running normally. Readings for dehydrators are on sheet 2. Equipment operational readings are available on hard copy.
	12:00 AM	Plant is in liquefaction and running normally. Readings for dehydrators are on sheet 2. Equipment operational readings are available on hard copy.
	1:00 PM	Plant is in liquefaction and running normally. Readings for dehydrators are on sheet 2. Equipment operational readings are available on hard copy.
	1:30 PM	Painters clean up and prepare for priming. During the prime painting Delashmitt driving JLG lift, Cagler spray painting, Spangler working parking lot to cover-up vehicles as needed, Hampton mixing paint and monitoring equipment, shagging hoses etc.
	2:00 PM	Plant is in liquefaction and running normally. Readings for dehydrators are on sheet 2. Equipment operational readings are available on hard copy.
	3:00 PM	Plant is in liquefaction and running normally. Readings for dehydrators are on sheet 2. Equipment operational readings are available on hard copy. Painters finish painting, clean up equipment, area and leave site
	4 00 PM	Plant is in liquefaction and running normally. Readings for dehydrators are on sheet 2. Equipment operational readings are available on hard copy.
	5.00 PM	Plant is in liquefaction and running normally. Readings for dehydrators are on sheet 2. Equipment operational readings are available on hard copy.
	6:00 PM	Plant is in liquefaction and running normally. Readings for dehydrators are on sheet 2. Equipment operational readings are available on hard copy.
	7:00 PM	Plant is in liquefaction and running normally. Readings for dehydrators are on sheet 2. Equipment operational readings are available on hard copy.
	7:20 PM	Joel Parris, plant operator, heard a loud noise, and upon investigation discovered the fire in the pretreatment area.
	7:22 PM	Joel notified 911 immediately, hit the ESD in control room, notified Chris Young, plant supervisor, and called operator, Norman Jernigan, for assistance.
	7:23 PM	Norman notifies Robert McCain and Terry Poss, plant operators, of situation.
	7:25 PM	The fire department arrived, would not enter plant site until a Haz-Mat team arrived.
	7:28 PM	Robert calls Joel to obtain information.
	7:30 PM	Robert and Norman head to plant site.
	7:35 PM	Chris notified Gary Northrup, LNG Technology Manager, that there was a fire incident at the plant with the extent unknown and he was in route. Chris would assess the situation and call back
	7:35 PM	Fire department notified the locals residents and businesses and asked both to stay inside.
	7:36 PM	A plan was discussed by the fire department to evacuate if needed but the need did not occur.
	7:39 PM	Power & Phones lost.
	7:40 PM	Haz-Mat team arrives
	7:40 PM	Robert arrives at plant.
	7:50 PM	Chris encounters police road block and gets permission to pass but is stopped at fire dept. roadblock.
	7:55 PM	Fire Department sends two firemen into the area.
	8:07 PM	The fire department came on site with Robert. During this time Joel manually closed the inlet valve on the meter set and attempted to put the fire out with control room monitor. The pressure on the fire main was low, the fire department had the pressure boosted and proceeded to cool down

8:10 PM Chris spoke with Chief Appleberry the Chattanooga Fire Department Scene Commander. Chris informed him that he had spoke with Joel at 1925 hrs. Appleberry asked if the fire could be contained and minimized. and was informed securing the gas flow to the plant should extinguish the fire.

8:13 PM Fire was extinguished, personnel on site continue to cool down surrounding vessels for another hour and a half.

8:25 PM Chris enters plant site to assess situation, assumed a supervising role over AGLC personnel and the role of liaison with the Chattanooga Fire Department personnel present at the scene.

8:30 PM Gary paged Chris to obtain an update on the situation. Chris explained the fire situation and informed Gary of presence of local media.

8:45 PM Gary notified Richard Rogers, Managing Director – Gas Operations, of the situation.

9:00 PM Gary contacted Nick Gold, Corporate Communications, explained the situation, and got direction on issuing a statement to the media.

9:15 PM Gary contacted Chris to inform Chris that he was on the way. Chris informed Gary of the request made by the News Media for a statement and cause of the fire. Gary replied that he had spoken with Atlanta Gas Light Company Corporate Communications and they had given us authority to supply information to the News Media. Gary asked Chris to relay this information to the media. Chris spoke with Captain Bruce Garner, Public Information Officer - Chattanooga Fire Department, and told him he would give the News Media a brief statement on the incident. Bruce Garner informed the Media that a statement was forth coming as soon possible. The News Media understood and would stand-by for the statement.

9:20 PM Chris briefed Chief Appleberry on conditions of the plant. Chief Appleberry asked for an approximate time that an 'all clear' could be given. Chris told him that after he returned to the scene an 'all clear' could possibly be given within twenty to thirty minutes. Chris assembled a team of one LNG Plant Operator and four Chattanooga Gas Company personnel that had been held at the Command Site

9:30 PM Gary contacted Richard to relay statement information and to inform Richard that he was headed to Chattanooga LNG Plant
Chris arrived back on the plant site with the additional personnel. These personnel in conjunction with the existing on site personnel were used in confirming that the 'all clear' could be given

9:40 PM Richard notified Tommy Burruss, Chief Investigator - AGLC, of incident, informed him there were no personnel injuries and requested his presence the following morning at the Chattanooga LNG Plant.

9:50 PM After an agreement was reached between the LNG Plant personnel, Chattanooga Gas Company personnel and Chattanooga Fire Department personnel, the 'all clear' was given to the Chattanooga Fire Department On-Scene Commander.

10:00 PM Gary headed to Chattanooga LNG Plant. Norman Jernigan, plant operator, arrived on plant site

10:15 PM Chris went to the Control Room and made a review of the Emergency Procedures Manual to double check if all items had been completed. After begin satisfied all procedures had been performed to the best of our abilities the process of restoring power to the Control Building was undertaken.

10:55 PM Terry Poss, Plant Operator on plant site.

11:00 PM Power was restored to the control building

11:10 PM Chris located Captain Bruce Gardner and informed him he was ready to speak with the News Media.

11:15 PM Accompanied by Captain Gardner, Chris proceeded to the News Media's location at the corner of North Hawthorne Street and Wilder Street. Several investigation. news reporters from the Chattanooga area were in attendance. Chris informed them there had been no personnel injuries and the plant area had been secured. Chris informed them the source or cause of the fire appeared to have come from a pipe flange in the plant liquefaction process area but was still under
After answering questions for approximately fifteen minutes Captain Gardner and Chris returned to the plant control building.

11:30 PM Perimeter Lighting was restored

11:35 PM The Chattanooga Fire Department asked Chris if there was any further assistance was needed from them. Chris replied that the area was secured and no further assistance was needed.

11:40 PM The Chattanooga Fire Department left the plant.

10.24.00

12:00 AM Gary arrived at Chattanooga LNG Plant, talked with plant personnel, an assessment was made of the extent of the damage and it was then determined that this was a reportable incident. The initial estimated extent of the damage was between $750,000.00 and $1,500,000.00.

12:45 AM Gary notified the Department of Pipeline Safety of the incident and received Report # 546070 from Mr. Loreck.

12:55 AM Gary notified Mr. Glynn Blanton, Tennessee Regulatory Agency, by placing a message on his home answering machine. Gary also notified the TRA's Response Center and left a message on their answering machine.

2:00 AM Player & Company on site to start work on boiloff compressors and tank foundation heaters.

4:00 AM Player & Company continues work on locating boiloff compressor control and power cable.

6:00 AM Player & Company continues work on locating boiloff compressor control and splicing the power cable.

8:00 AM Allen Bayshore, National Transportation Safety Board was notified of incident.
Tommy Burruss, Chief Investigator - AGLC, on plant site to investigate situation.
Richard Rogers on plant site to investigate situation.

9:00 AM Spoke with Glynn Blanton, Tennessee Regulatory Authority, about situation and sequence of events leading up to and through the fire.
Glynn stated he was sending out two engineers to access the situation.

10:00 AM David Dellinger & Ron Hayes, Crawford Claims Management Services on plant site to investigate situation.

11:00 AM Earnest Brake and Tom Woolsey, Tennessee Regulatory Authority, on plant site to investigate situation.

2:00 PM Discussed with Earnest and Tom their findings and the sequence of events leading up to and through the fire.
Preliminary investigation has shown a blown gasket on a flange in the pretreatment area allowed for the release of 230 psi gas into the process area.
A ruptured pipe was also found in the pretreatment process area. The source of ignition is still under investigation.

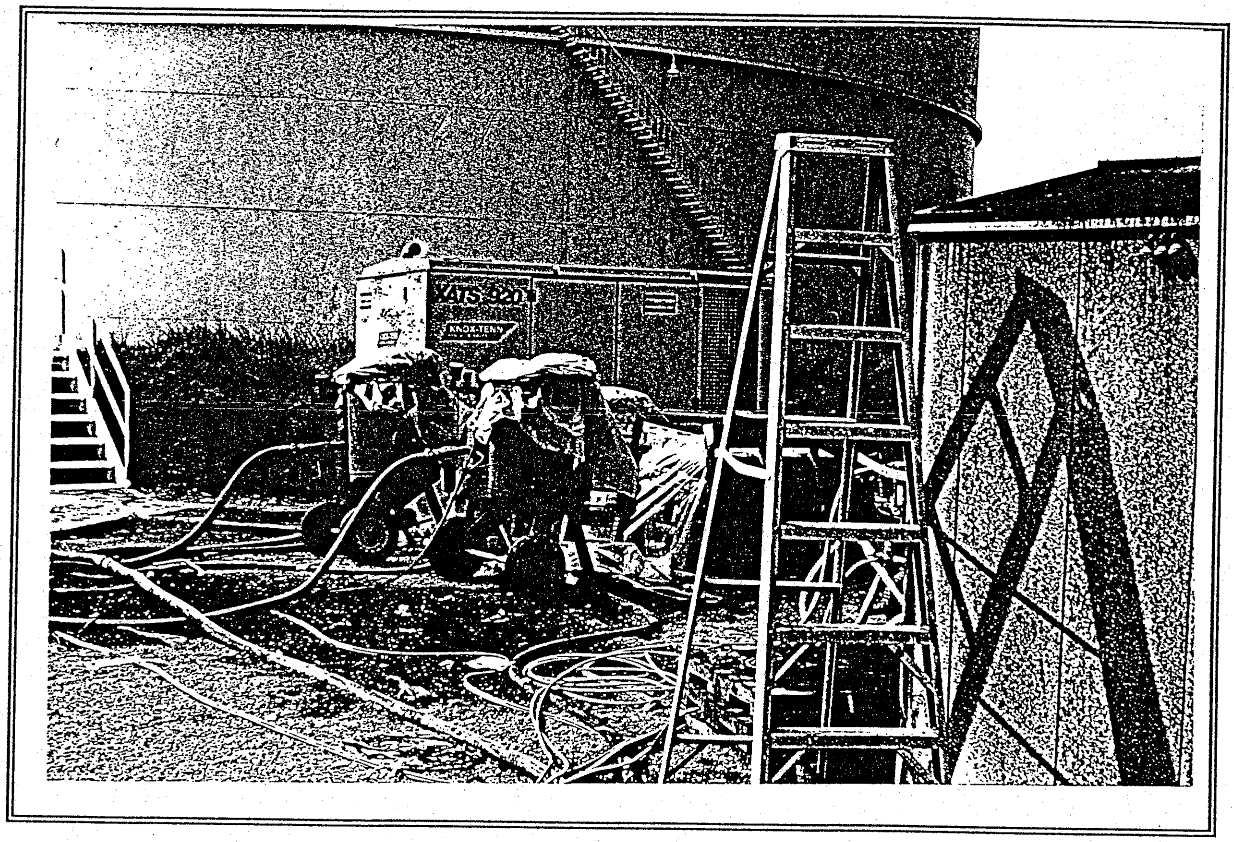
6:00 PM Player & Company has boiloff compressor operational.

APPENDIX C

TRA PHOTOGRAPHS

Appendix C

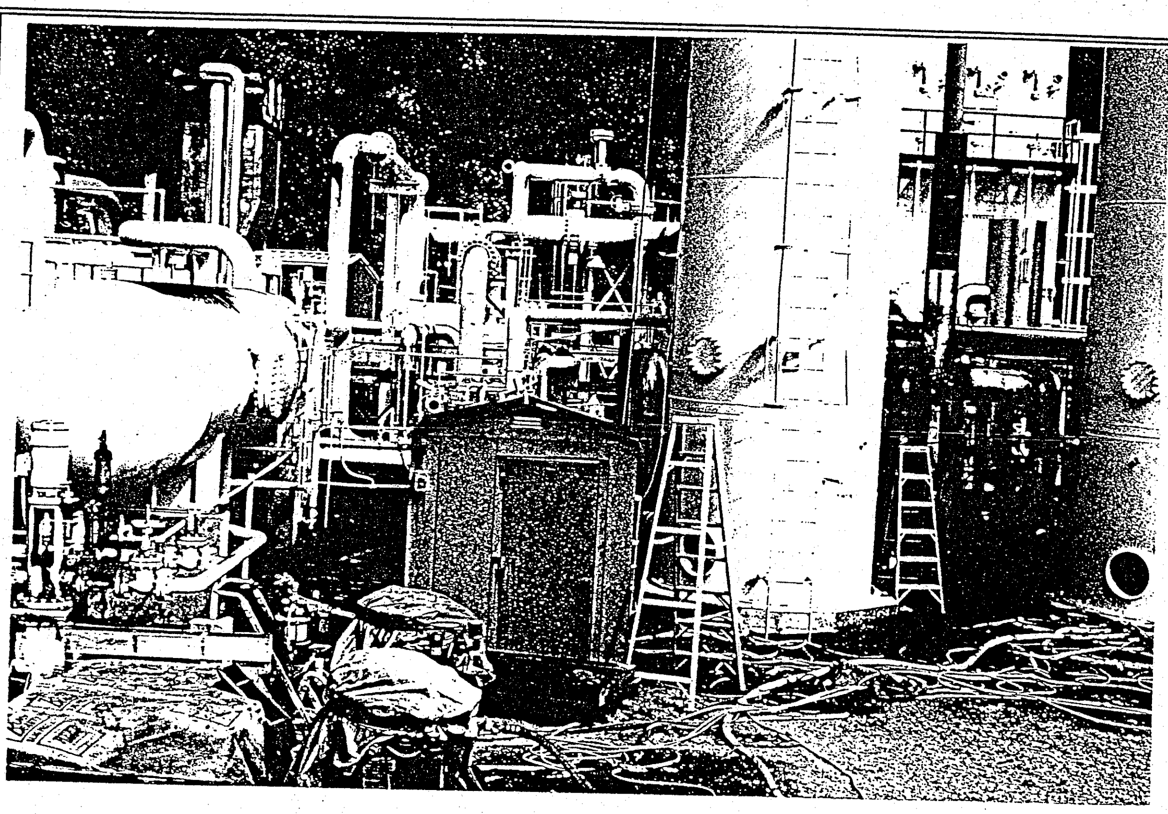
Photograph Number 1



Foreground: Air compressor, sandblast pots, sandblast materials.
Background: LNG storage tank.

Appendix C

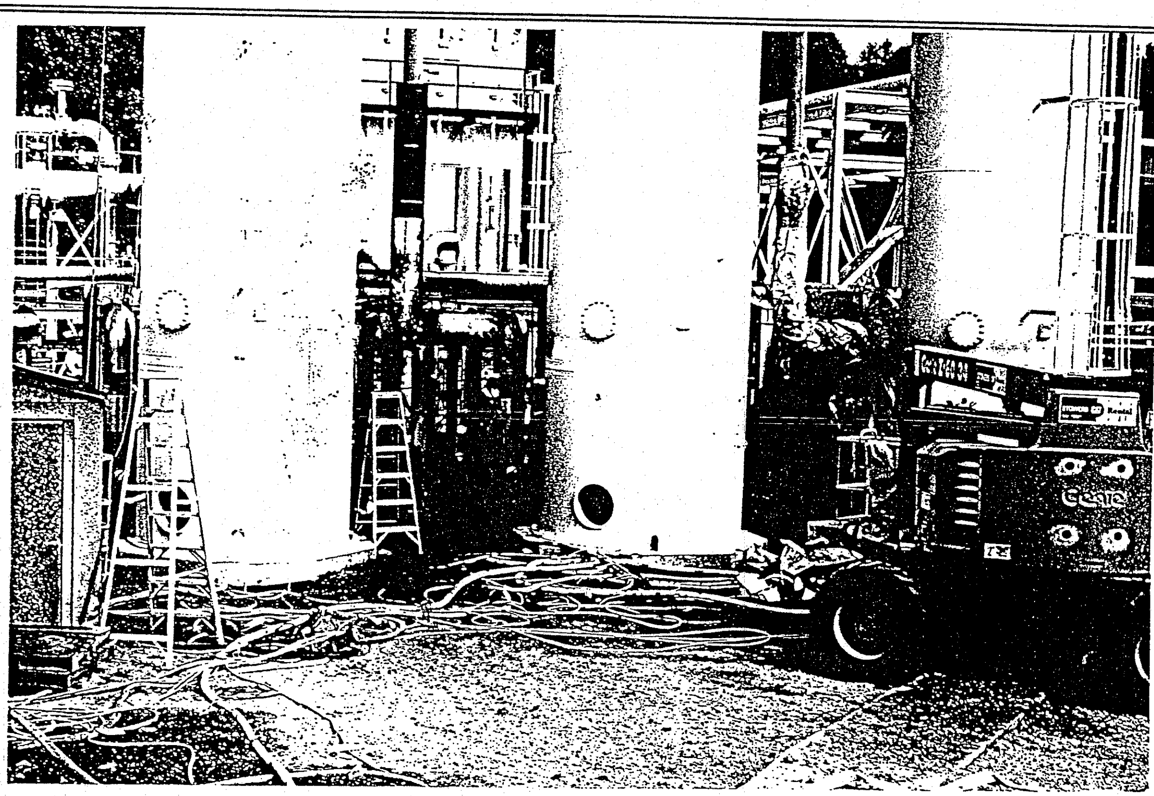
Photograph Number 2



Foreground: Sandblast pots, hoses and sandblast material (Black Beauty).

Appendix C

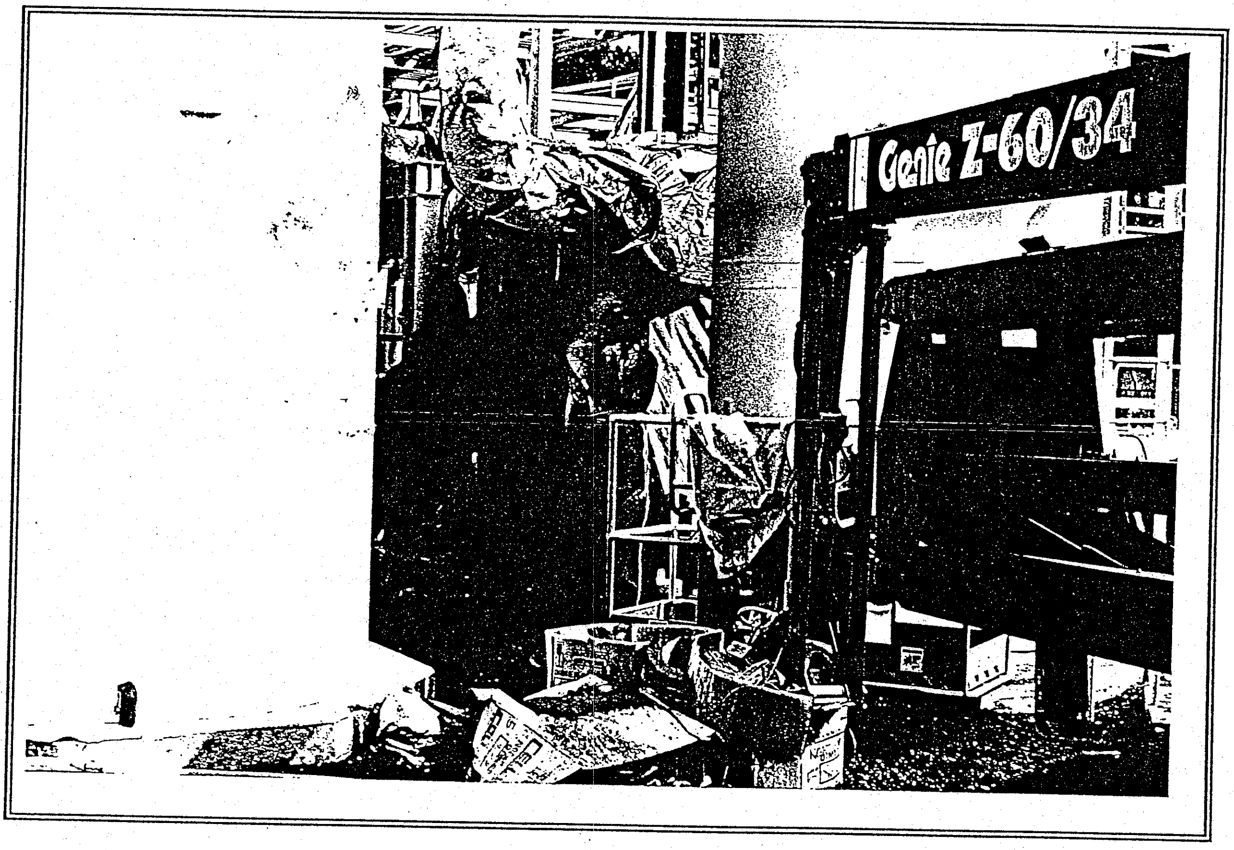
Photograph Number 3



View of dehydrator units with heat affected area visible to left of center unit (unit B). Note protective tarps covering piping to right of Dehydrator B and sandblasting/painting hoses in foreground.

Appendix C

Photograph Number 4



View of plastic and canvas tarps used for protection from sandblasting/painting.

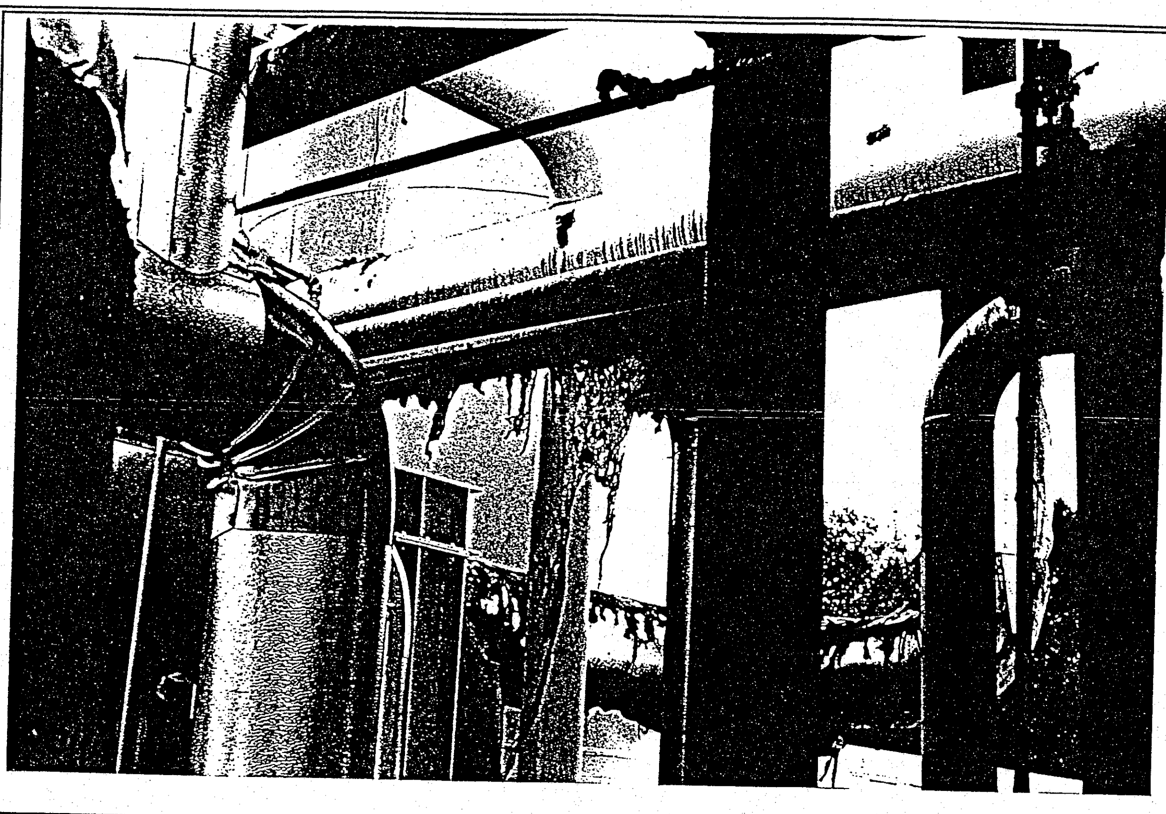
Appendix C

Photograph Number 5

Close up of tarps. Note that blue tarp is a plastic material.

Appendix C

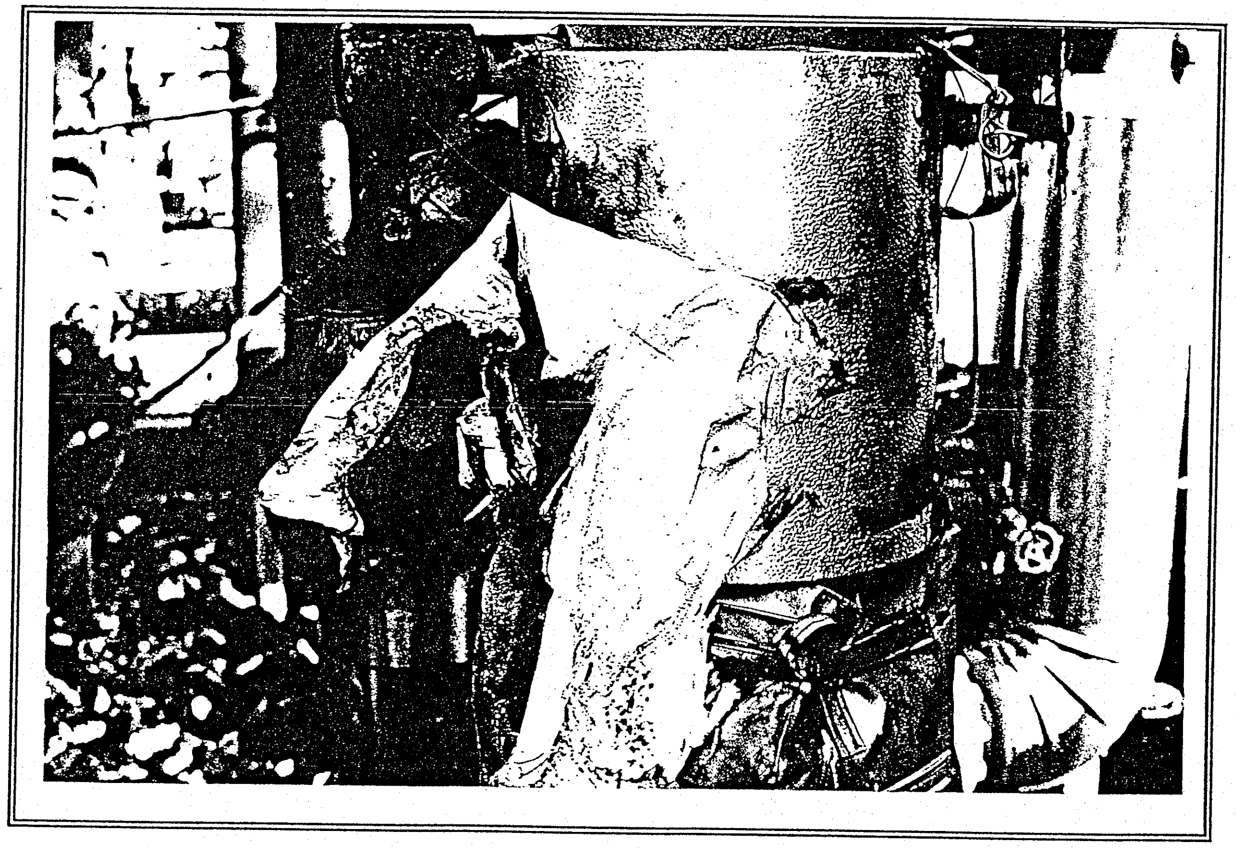
Photograph Number 6



Remnants of plastic tarp after fire damage.

Appendix C

Photograph Number 7



Remnants of tarp material tied to piping below flange assembly.

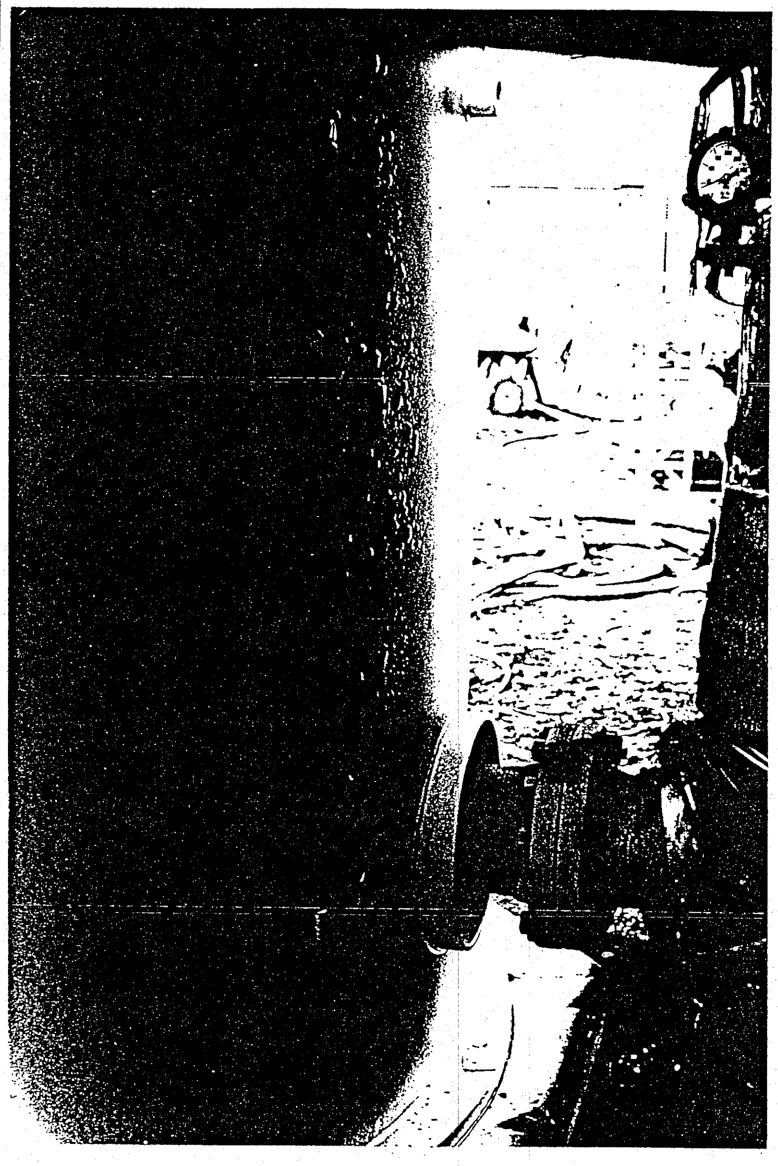
Appendix C

Photograph Number 8

Foreground: Hoses from sandblasting/painting operation. Background: Looking into heat affected area beyond Dehydrator B.

Appendix C

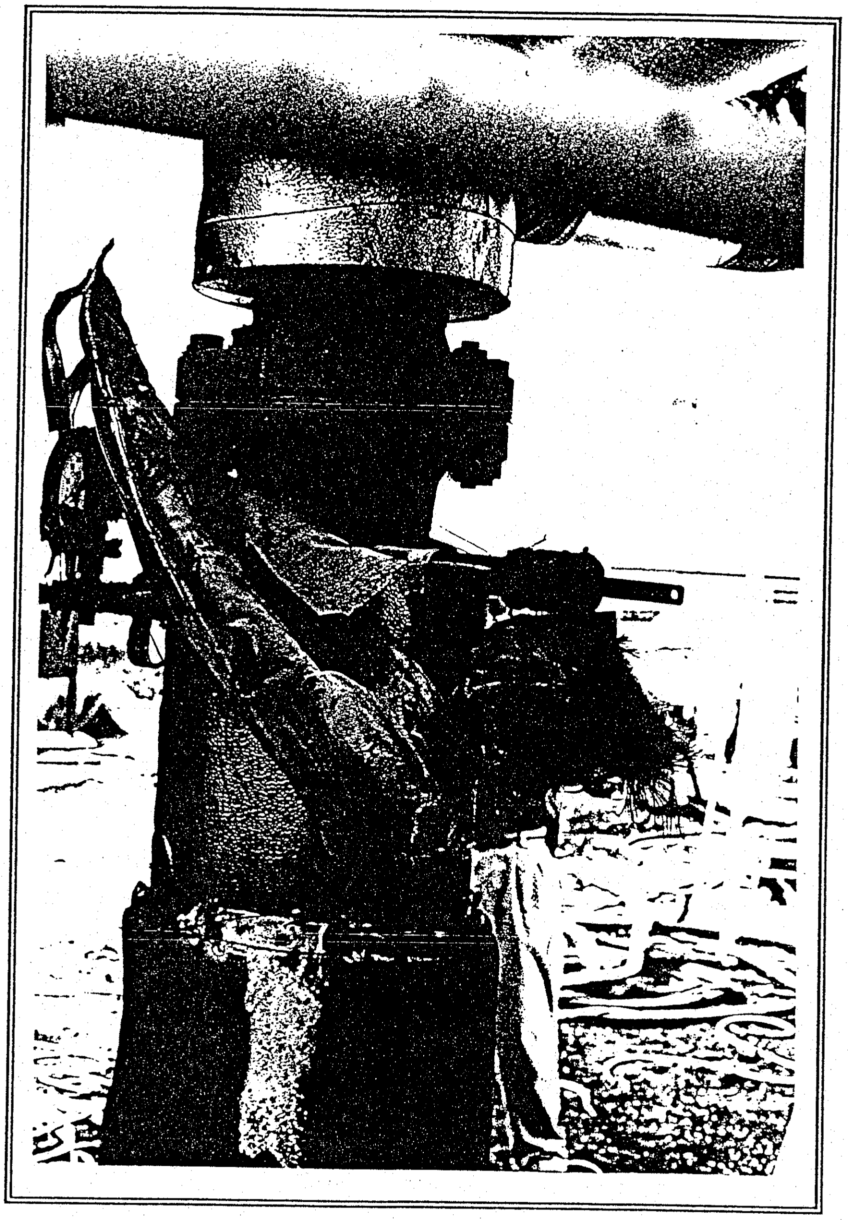
Photograph Number 9



Slight paint blistering on Dehydrator B. This unit was behind the flame and sustained only minor damage.

Appendix C

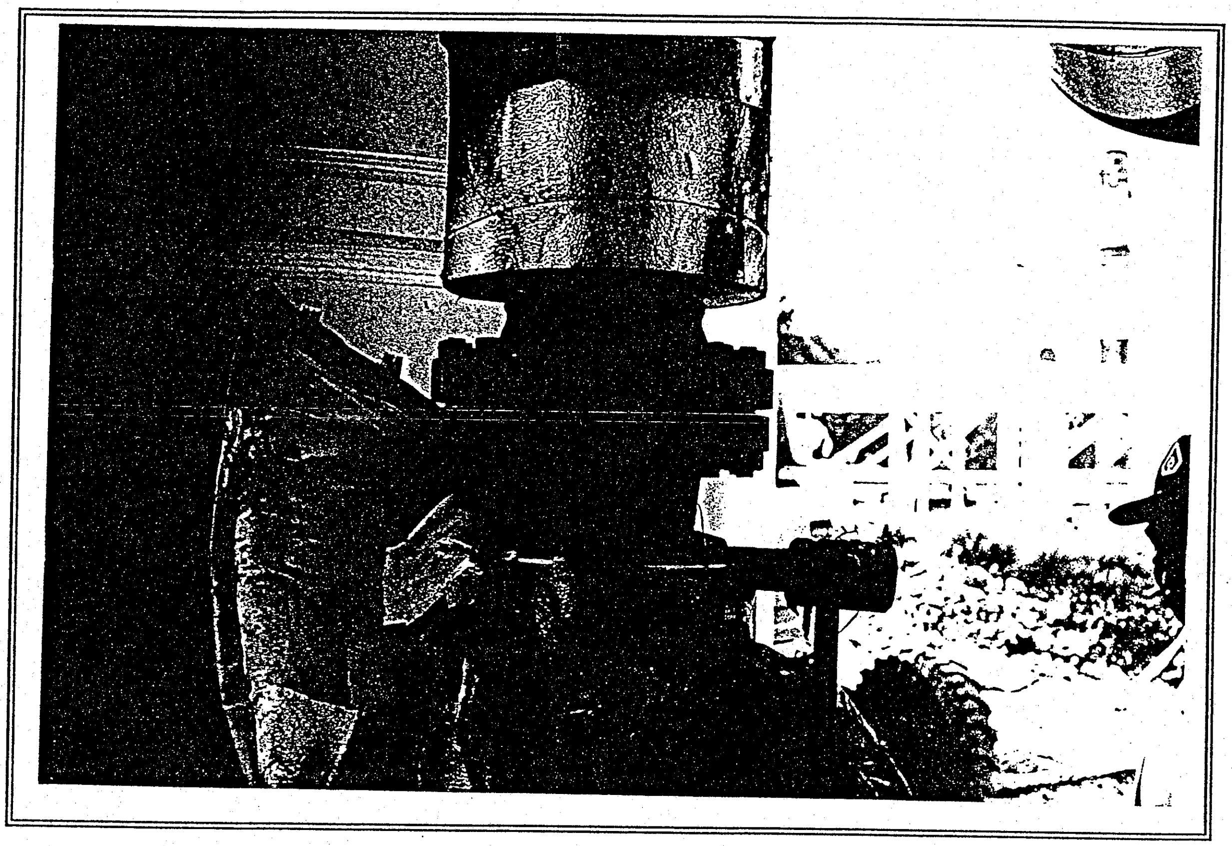
Photograph Number 10



Flange assembly were initial leakage occurred.

Appendix C

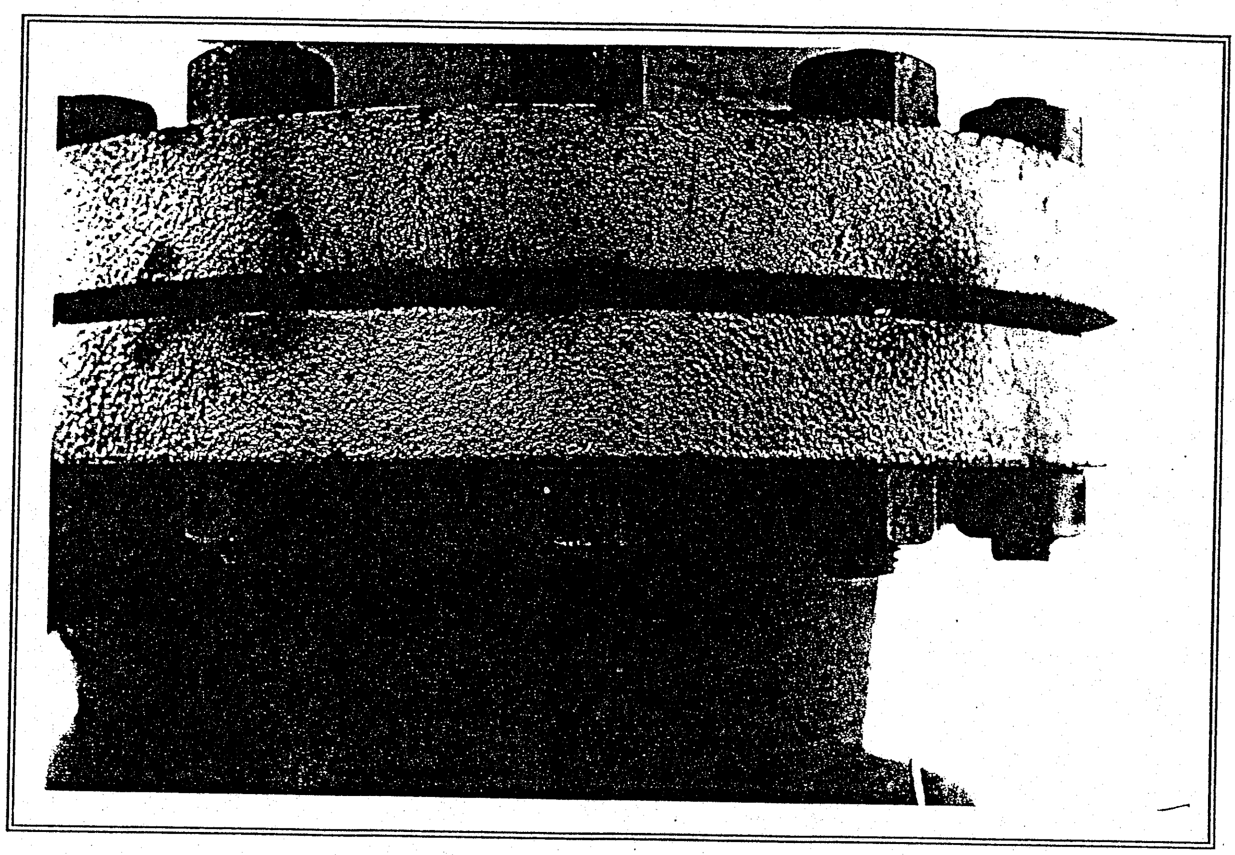
Photograph Number 11



Flange assembly viewed in line with flame propagation.

Appendix C

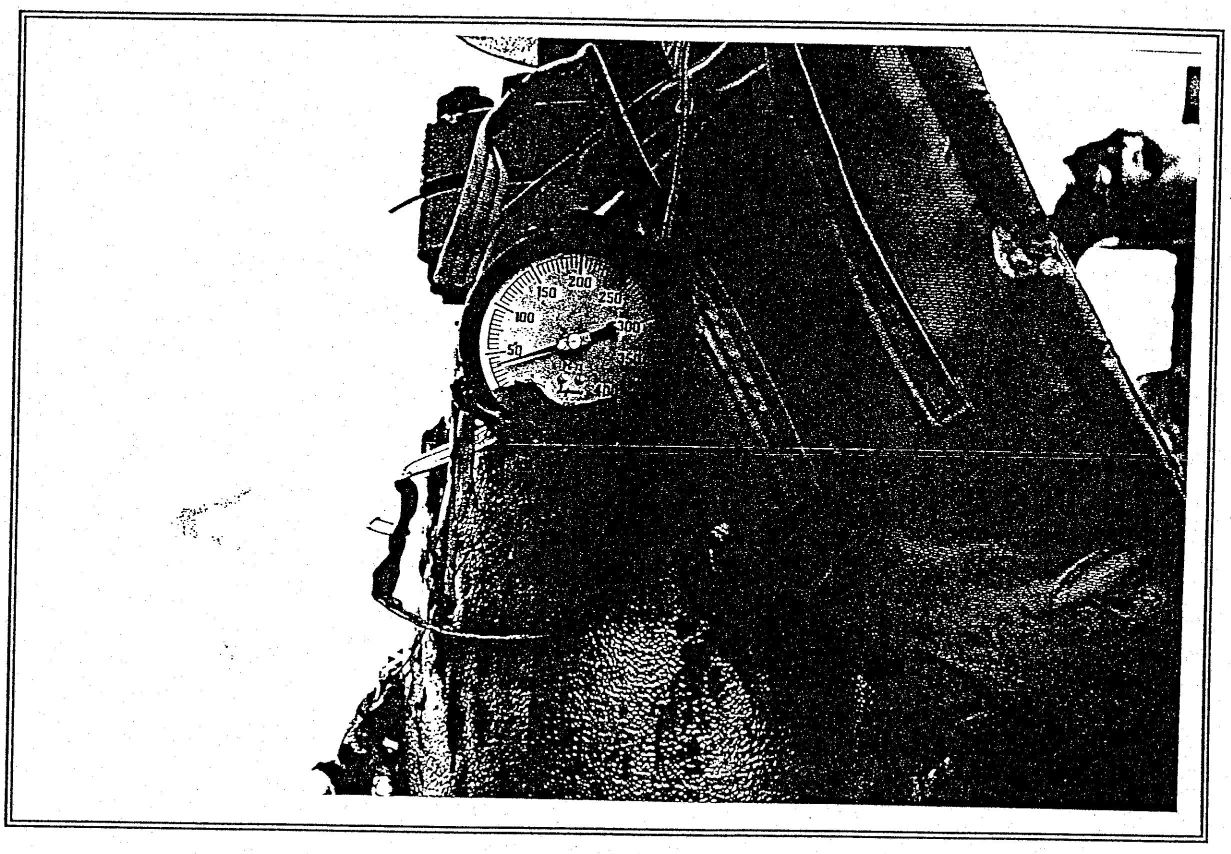
Photograph Number 12



Close up of flange assembly. Note gasket material visible between bolts at right of flange but none visible elsewhere.

Appendix C

Photograph Number 13



Heat damage to pressure guage and insulation at flange assembly where leakage occurred.

Appendix C

Photograph Number 14

Foreground: Vertical piping with fish mouth rupture.
Background: Flange assembly where leakage occurred.

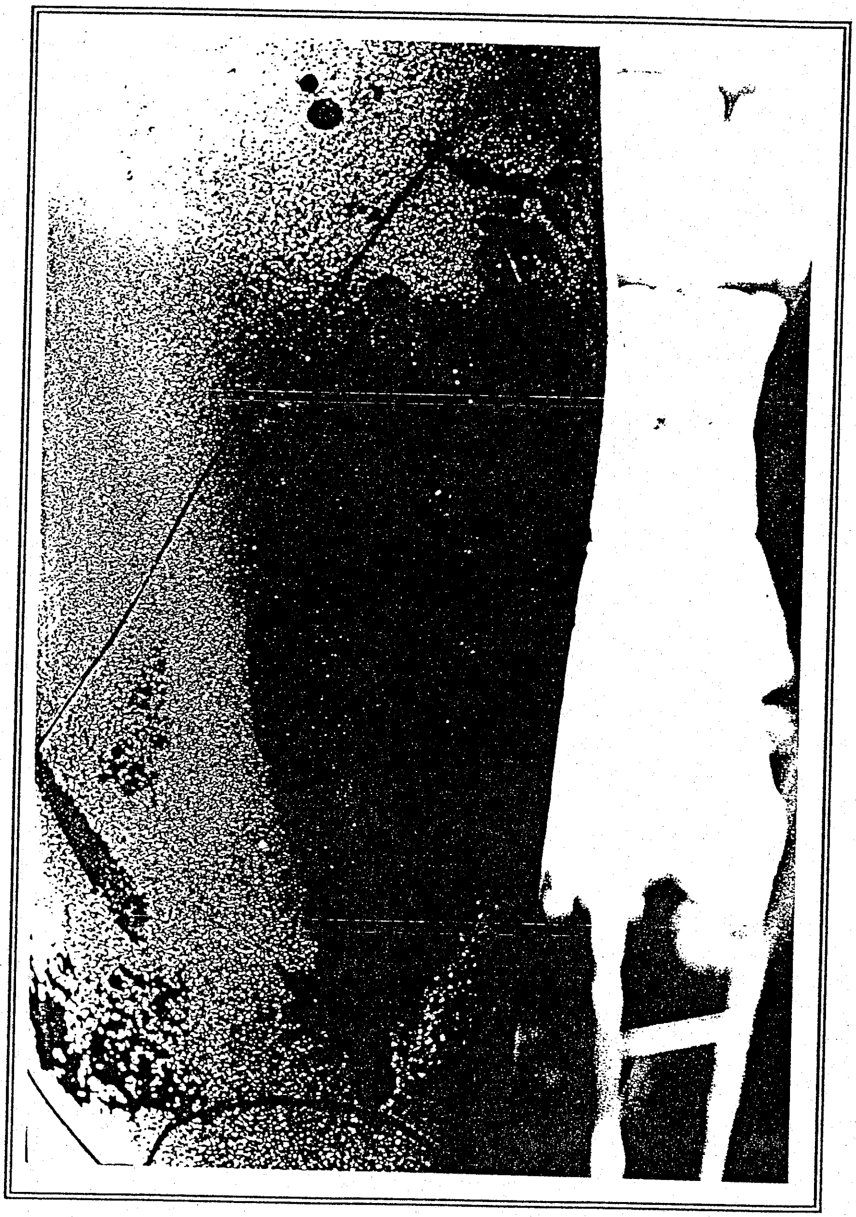
Appendix C

Photograph Number 15

View of fish mouth rupture with flange assembly in background. Note conduit runs to left of center.

Appendix C

Photograph Number 16



Close up view of fish mouth rupture.

Appendix C

Photograph Number 17

Fish mouth rupture, close up view.

Appendix C

Photograph Number 18

Process piping damaged by heat. Far right: Control valve exhibiting heat damage.

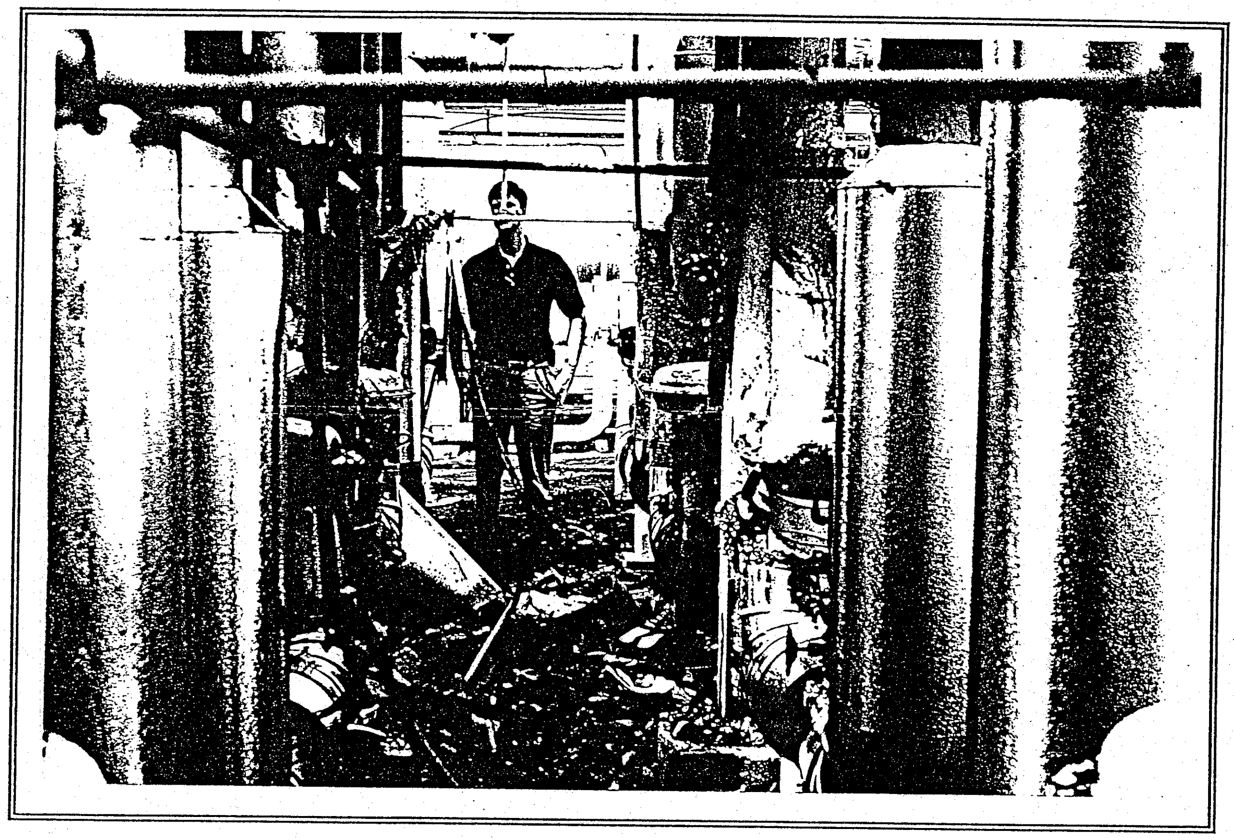
Appendix C

Photograph Number 19

Piping damaged by heat. Note charred remains of insulation on ground.

Appendix C

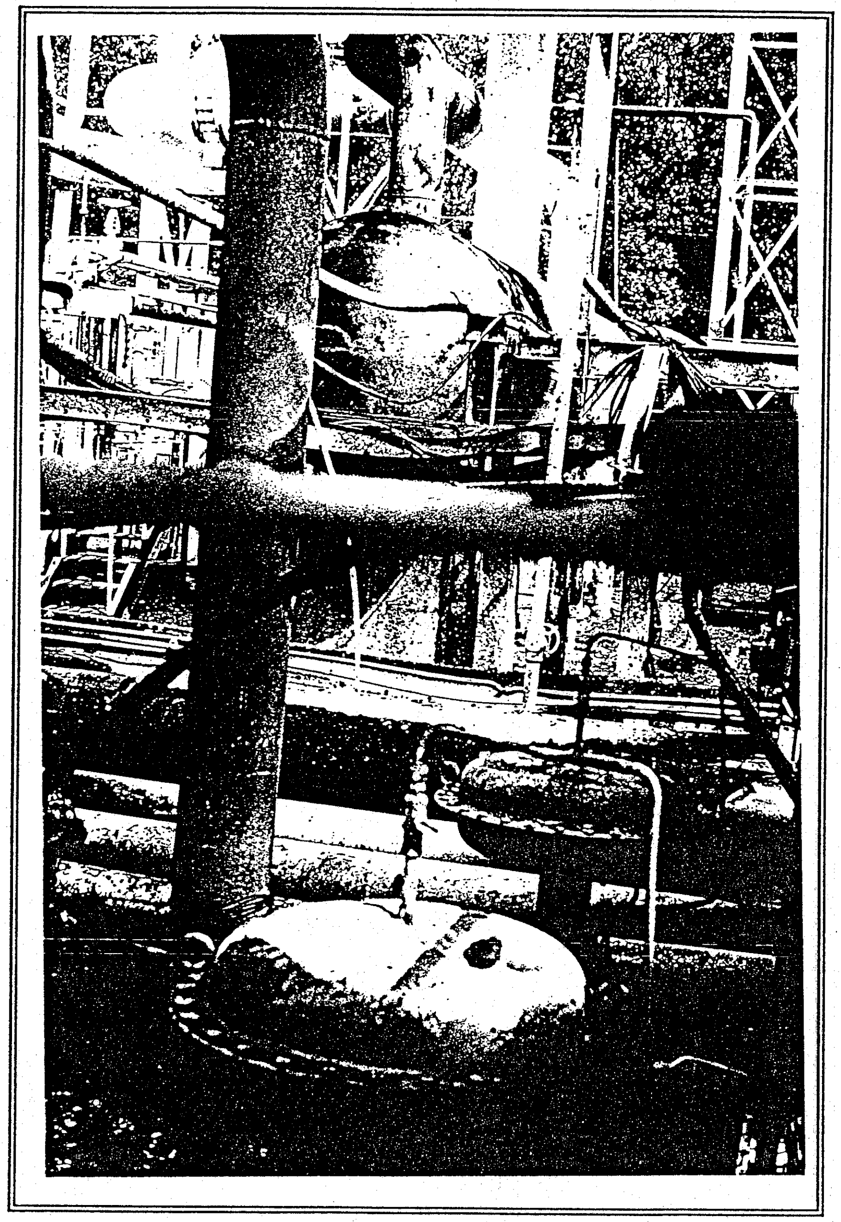
Photograph Number 20



View of heat affected area at right angle to flame propagation.

Appendix C

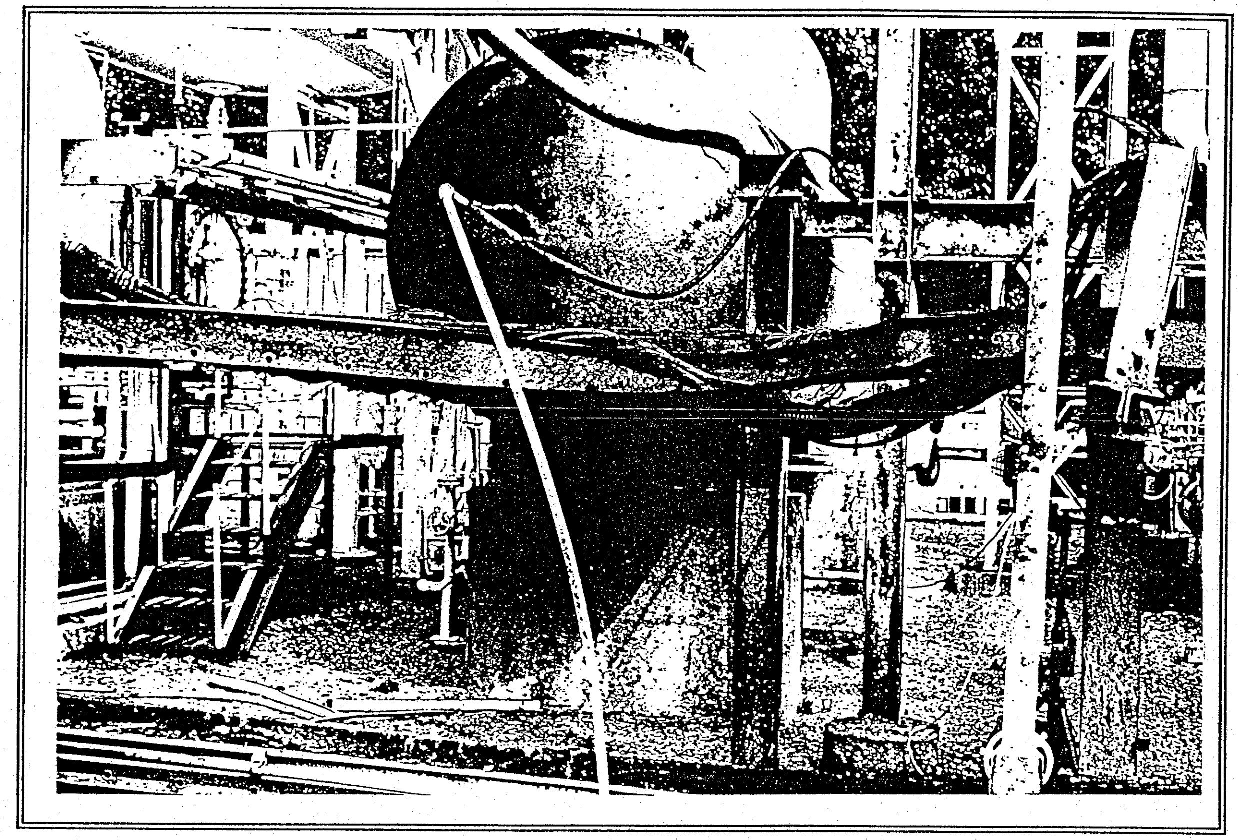
Photograph Number 21



Foreground: Process valves and piping damaged by heat. Background: Wire trays and MRL tank showing affects of heat.

Appendix C

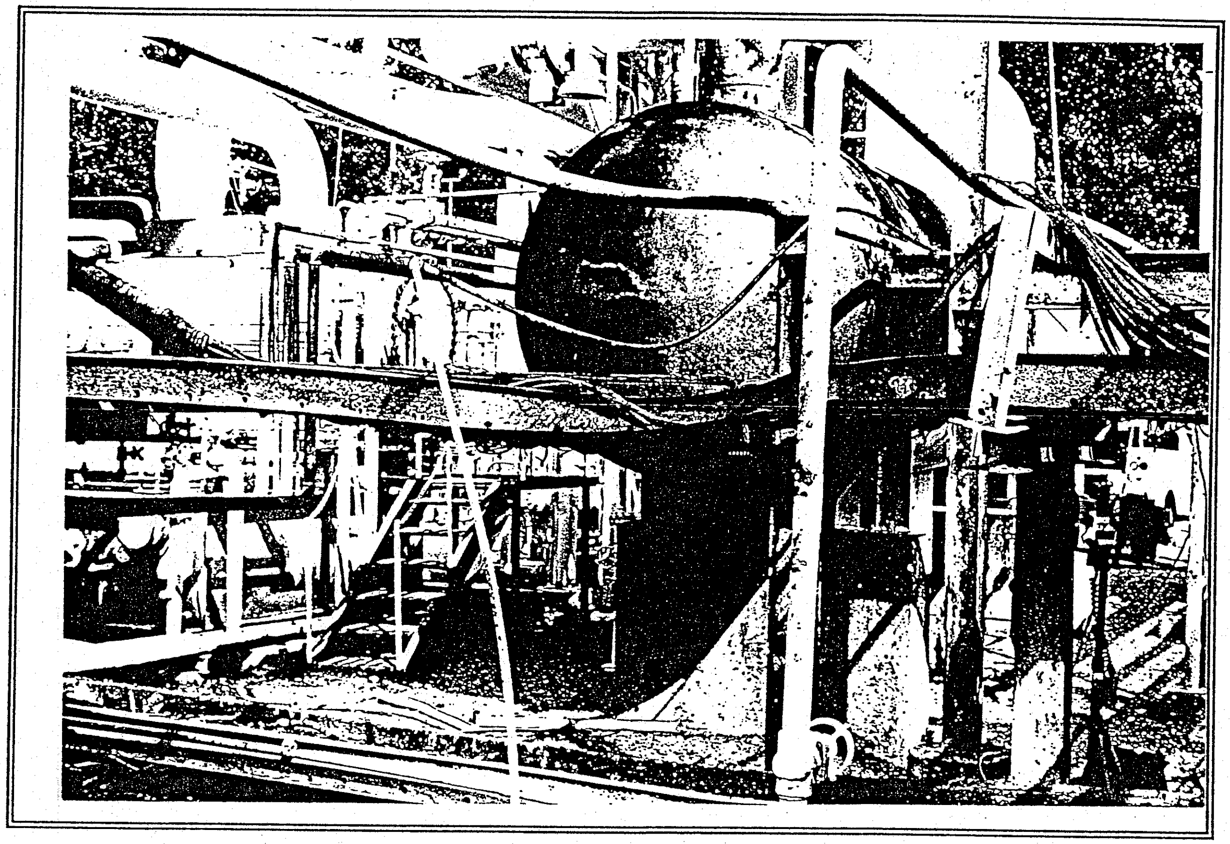
Photograph Number 22



Subject same as previous photograph at slightly different angle.

Appendix C

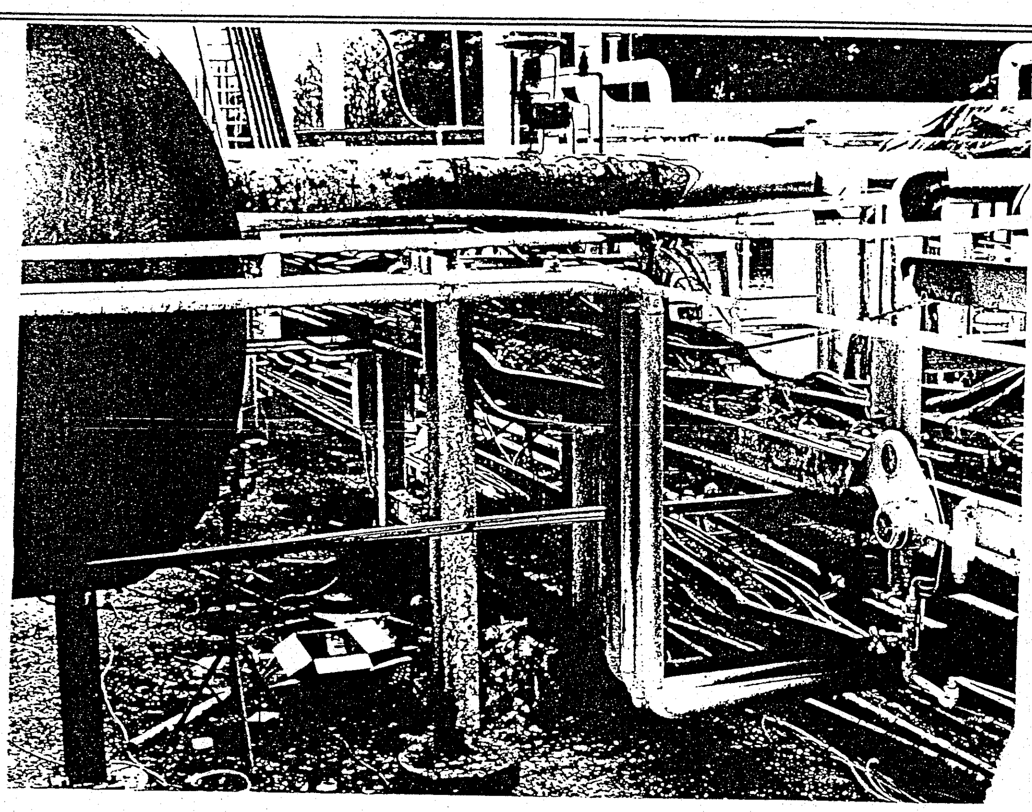
Photograph Number 23



View of MRL tank and wire tray damage. Two wire trays are visible in this photograph. A 20' section of a third wire tray was consumed by the fire.

Appendix C

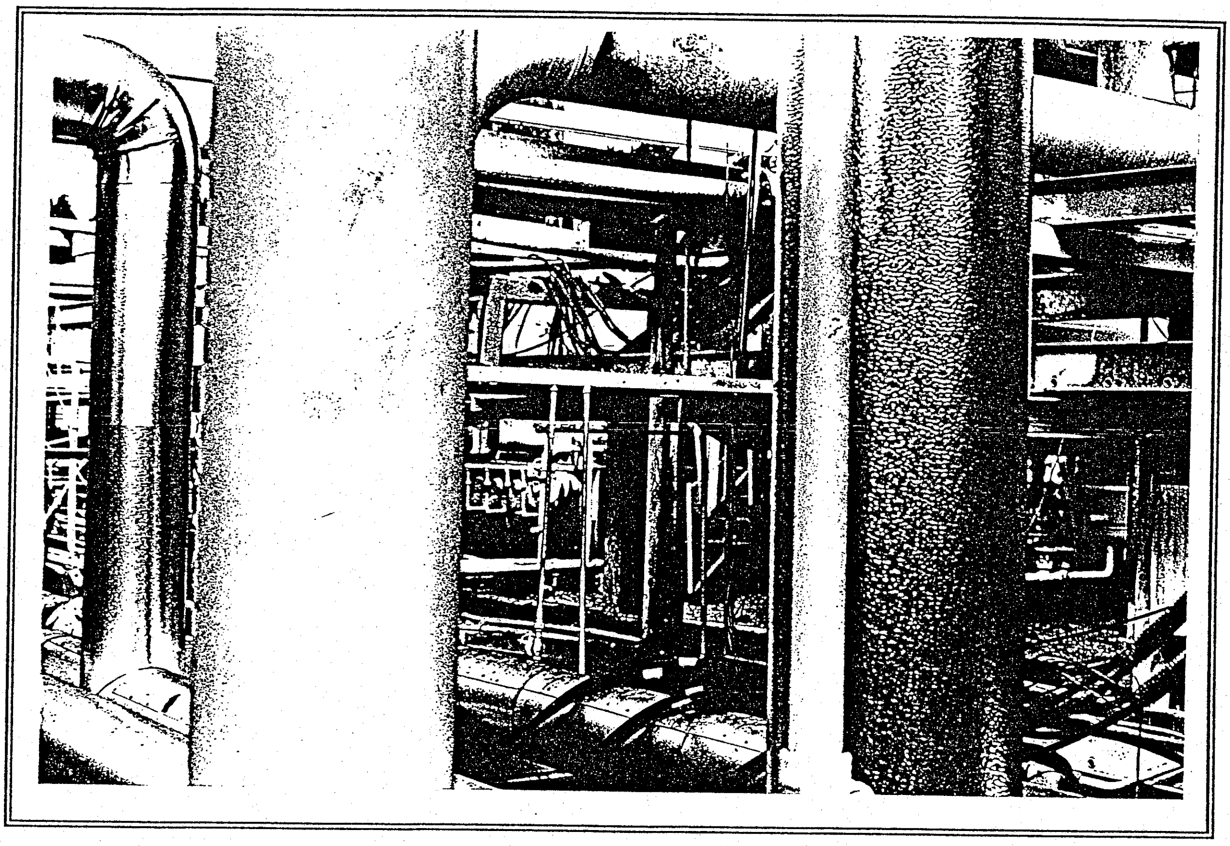
Photograph Number 24



Damage to wire trays and MRL tank. New wire at bottom of photograph is temporary wiring to restore some plant functions.

Appendix C

Photograph Number 25



Foreground: Temporary wiring installed to restore plant functions.

APPENDIX D

CHATTANOOGA LNG EMERGENCY MANUAL

CHATTANOOGA GAS COMPANY

CHATTANOOGA LNG PLANT

3401 North Hawthorne Street

Chattanooga, TN 37406

EMERGENCY MANUAL

1.1 PURPOSE

The purpose of this section is to define necessary actions by operating personnel during times of on-site emergency conditions.

1.2 RESPONSIBILITY

The Plant Supervisor or his designee shall be responsible for insuring proper implementation of the requirements set forth in this procedure. Plant personnel are responsible for the performance of duties outlined herein.

1.3 DISCUSSION

Under on-site emergency conditions, organization, cooperation, regulation and competency are absolute requirements. Plant personnel on duty shall perform functions deemed necessary for the protection and safety of Company property and personnel.

1.4 PRECAUTIONS

All safety rules and regulations shall be followed to reduce or eliminate the possibility of accidents.

1.5 PREREQUISITES

- Plant personnel shall be thoroughly familiar with the site and facilities.
- Plant personnel shall be trained on an on-going basis for proper and required response during an on-site emergency.
- Plant personnel shall be completely familiar with emergency procedures and use of emergency equipment.
- Plant personnel shall know the location of all fire fighting, safety and emergency medical equipment.

1.6 LIMITATIONS AND ACTIONS

As detailed in appropriate procedures and as dictated by good common sense, judgment and training.

1.7 MATERIAL AND/OR TEST EQUIPMENT

Fire fighting, safety and emergency medical equipment.

1.8 PROCEDURE

- All plant personnel shall be constantly alert for emergency situations while on duty and shall be thoroughly familiar with the facility.
- Any emergency shall be immediately reported to another Control Room for interface with and notification of all authorized personnel and for initiating procedural steps required.

- The plant personnel at the scene of the emergency shall assist or initiate action to help control the emergency until other help arrives.

- Plant personnel are considered members of the Fire Brigade and may be used to assist in fire fighting.

- Outside fire fighting or medical assistance may be required. The plant personnel shall call for this assistance when an assessment indicates the need. When in doubt, call in off-site assistance.

1.9 EMERGENCY TELEPHONE NUMBERS

- In the event of an on-site emergency notify the Chattanooga Fire Department & Police Department: 911, notify CGC Gas Dispatcher: 423-892-7220

- Also, notify each of the following:

  LNG Plant Supervisor: **Chris Young**

  Office: 423-624-4843 Ext. 611
  Cell: 770-315-5208
  Pager: 404-776-0954
  Home: 423-554-4188

  LNG Operations Manager: **Gary Northrup**

  Office: 770-479-2125 Ext. 202
  Cell: 770-856-2125
  Pager: 404-776-0950
  Home: 770-924-2543

  Managing Director – Gas Operations: **Richard Rogers**

  Office: 770-479-2125 Ext. 201
  Cell: 404-275-9484
  Pager: 404-776-0969
  Home: 770-345-7022

- Plant operator will determine others to be notified depending on the type of emergency. The State Environmental Protection Division may be notified, for example, in the event of a hydrocarbon spill. The National Response Center for oil and chemical spills (1-800-424-8802) may also be notified. Electric Power Board: 423-629-3244 Tennessee American Water Company: (Normal hours) 423-267-0021 (After hours) 423-266-3006

EMERGENCY INSTRUCTIONS FOR GAS COMPANY DISPATCHER

LNG PLANT WILL CALL OR RADIO IN CASES OF:

1. Any injuries to personnel.
2. Fire at the LNG Plant.
3. Liquid spill at the LNG Plant.

DISPATCHER- IN CASE OF PERSONNEL INJURY

1. In case of personnel injury, send nearest Company vehicle to the LNG Plant to give assistance to Plant Operator.
2. Call ambulance if requested to do so by Plant Operator.
3. Notify Supervisor, **Chris Young**,

   Office: 423-624-4843 Ext. 611
   Cell: 770-315-5208
   Pager: 404-776-0954
   Home: 423-554-4188

4. Notify LNG Operations Manager, **Gary Northrup**

   Office: 770-479-2125 Ext. 202
   Cell: 770-856-2125
   Pager: 404-776-0950
   Home: 770-924-2543

NOTIFICATION OF FIRE OR SPILL AT THE LNG PLANT

1. Confirm that the Fire Department has received the call.
2. Send the nearest Company Vehicle into area to maintain communication.
3. Notify Chris Young, Plant Supervisor
4. Call in Plant Operators requested by Mr. Young to assist in emergency.
5. Call Gary Northrup, LNG Operations Manager
6. Call Richard Rogers, Managing Director - Gas Operations

PLANT CALL LIST

LNG Plant Supervisor: **Chris Young**

Office: 423-624-4843 Ext. 611
Cell: 770-315-5208
Pager: 404-776-0954
Home: 423-554-4188

LNG Operations Manager: **Gary Northrup**

Office: 770-479-2125 Ext. 202
Cell: 770-856-2125
Pager: 404-776-0950
Home: 770-924-2543

Managing Director – Gas Operations: **Richard Rogers**

Office: 770-479-2125 Ext. 201
Cell: 404-275-9484
Pager: 404-776-0969
Home: 770-345-7022

LNG Plant Operators:

Robert McCain
Office: 423-624-4843 Home: 706-866-4687

Norman Jernigan
Office: 423-624-4843 Home: 423-629-6123 Cell: 423-447-7756

Terry Poss
Office: 423-624-4843 Home: 423-867-7855

Riverdale LNG Plant Control Room	770-478-2442	Ext. 412	Location 1300
Cherokee LNG Plant Control Room	770-479-2125	Ext. 312	Location 1320
Macon LNG Plant Control Room	912-746-1601	Ext. 512	Location 1328

TELEPHONIC REPORTS (D.O.T. - T.R.A. - FERC)

At the earliest practical moment following discovery of an incident, notice shall be given to the Office of Pipeline Safety, (1-800-424-8802), the Tennessee Regulatory Authority 1-800-342-8359 ext.2844, Glynn Blanton, Pipeline Safety Director, and the Federal Energy Regulatory Committee 1-202-208-0091 Robert Arvedlund or to the individuals listed below, by the Safety Director or Company Officer of the following incidents:

	Office Phone #	Home Phone #	Pager
Glynn Blanton	800-342-8359 ext. 2844	615-370-1125	615-780-6854
Ernest Burke	615-741-2844	615-395-4655	615-780-6856
Milton Henderson	615-741-2844	615-793-2350	615-780-6157
Tom Woolsey	615-741-2844	615-353-1004	615-780-6857
Brad Williams	615-834-3367	615-834-3367	615-780-4785
Response Center	615-741-2844	800-424-8802	

FERC:

Robert Arvedlund	202-208-0091
Chris Zerby	202-208-0111
Hugh Thomas	202-208-0908

1. An event that involves a release of gas from a pipeline or liquefied natural gas or gas from an LNG facility and
   (i) A death, or personal injury necessitating inpatient hospitalization; or
   (ii) Estimated property damage, including cost of gas, of the operator or others, or both, of $50,000(**DOT, TRA, FERC**); $5,000 (**TRA, FERC**).
2. An event that results in an emergency shutdown of an **LNG** facility.
3. An event that in the judgment of the operator, even though it did not meet the criteria of paragraph (1) or (2), is significant.

The telephonic report to **DOT, TRA and FERC** should contain:

1. Name of operator and person making a report and his telephone number.
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 is relevant to the cause of the incident or extent of the damages.

The Manager shall keep a complete record of the report, including drawings, etc., on file.

EMERGENCY PROCEDURES

FIRE IN PROCESS AREA

1. Depress nearest Emergency Shutdown Button.

2. Notify Fire Department by dialing 911.

3. Notify Atlanta Gas Light Central by Telephone @ 1-404-584-4477 or CGC Radios.

4. Notify Plant Supervisor, Chris Young.

4. Make sure Flare Pilot is burning.

5. Open GREEN Valves and GREEN/ORANGE Valves, Close RED Valves.
   a. Vent Refrigeration system to flare. Open Green/Orange Valves.
   b. Close Inlet and Outlet Block Valves. Close RED Valves and vent headers. Open GREEN Valves.
   c. Close Boiler Fuel Gas Valve. Close RED Valve.
   d. Close all Block Valves to LNG Storage Tank. Close RED Valves.

6. COOL affected equipment with water and attempt to extinguish fire.

8. Sound residential alarm in the event that the fire is endangering the LNG Storage Tank.

VAPOR LEAK

In the event of a major leak of vapor from the refrigerant system that cannot be easily stopped:

1. Shutdown the Refrigerant Compressor.

2. Call Chris Young, Gary Northrup or back up Operator.

3. Close all valves in loop to isolate leak.
   (DO NOT WALK THROUGH VAPOR TO WORK)
   a. Close Anti-Surge valve in Control Room.
   b. Close FV 118 Ref. Liq. Valve in Control Room.
   c. Close JT Valves.
   d. Close 24" and 8" Butterflies to Comp. Suction.
   e. Close 12" Butterfly and Ref. Vapor Line by PDIC 70.
   f. Close 14" Butterfly in Compressor Discharge.

4. Vent isolated section to flare header through nearest available vent line.

This procedure will vent the part of the loop associated with the leak as fast as possible and minimize the quantity of refrigerant vented through the leak.

BRUSH FIRE AWAY FROM PROCESS AREA

1. Depress nearest Emergency Shutdown Button.

2. Notify Fire Department by dialing 911.

3. Notify Atlanta Gas Light Central by Telephone @ 1-404-584-4477 or CGC Radios.

4. Notify Plant Supervisor Chris Young, Gary Northrup or back up Operator.

5. Attempt to extinguish fire.

6. If fire cannot be controlled, follow procedures under " Fire in Process Area " Starting with Step #4.

7. Sound residential in the event that the fire is endangering the LNG Storage Tank.

INJURY TO PERSONNEL

1. Request Ambulance, Dial 911

2. Notify Chris Young and inform as to type and severity of injury.

3. Administer First Aid in cases of stopped breathing, shock, severe bleeding and minor burns. Qualified medical personnel should attend to other injuries.

MAJOR LNG SPILL

1. Depress nearest Emergency Shutdown Button.

2. Notify Fire Department by dialing 911.

3. Notify Atlanta Gas Light Central by telephone @ 1-404-584-4477 or CGC Radios.

4. Notify Plant Supervisor Chris Young, Gary Northrup or back up Operator.

5. Sound Residential Alarm.

6. Make sure Flare Pilot is extinguished.

7. Close RED Valves, Open GREEN Valves.
   Close Inlet and Outlet Block Valves.
   Close RED Valves and Vent Headers.
   Open GREEN Valves.

8. Close all Block Valves to LNG Storage Tank. Close RED Valves.

<u>FIRE IN SPECIFIC AREAS</u>

1. Leak and Fire on flange to a Vaporizer.
   a. Depress nearest I-1 Shutdown.
   b. Notify Chattanooga Fire Department and Police by dialing 911.
   c. Notify Chris Young, Gary Northrup or back up Operator.
   d. Direct appropriate fire monitors on surrounding equipment to keep cool.
      <u>DO NOT ATTEMPT TO EXTINGUISH!</u> <u>DO NOT PUT WATER ON LNG!!</u>
   e. Isolate leak.
   f. After leak is stopped, extinguish remaining fire with dry chemical.

2. Flange leak with fire in Dehydrator area.
   a. Depress nearest I-1 Shutdown.
   b. Notify Chattanooga Fire Department and Police by dialing 911.
   c. Notify Chris Young, Gary Northrup or back up Operator.
   d. Isolate leak if possible.
   e. After leak is stopped, extinguish any remaining fire with dry chemical.

3. After leak is stopped, extinguish any remaining fire with dry chemical.
   a. Depress nearest I-1 Shutdown.
   b. Notify Chattanooga Fire Department and Police by dialing 911.
   c. Direct appropriate fire monitors on surrounding equipment to keep cool.
   d. Isolate leak if possible.
   e. Make determination if refrigerant loop should be vented to flare stack.
   f. Block off Methane feed at feed filter.
   g. After leak has been stopped, extinguish any remaining fire with dry chemical.

4. Refrigerant leak and fire between Turbine and Condenser.
   a. Depress nearest I-1 Shutdown.
   b. Notify Chattanooga Fire Department and Police by dialing 911.
   c. Direct appropriate fire monitors on surrounding piping and equipment.
   d. Isolate leak if possible and vent affected section.
   e. Determine if remaining refrigerant loop should be vented, vent if necessary.
   f. After leak has been stopped, extinguish remaining fire with dry chemical or water.

5. Electrical Fire at P-108.
   a. Depress nearest I-1 Shutdown.
   b. Notify Chattanooga Fire Department and Police by dialing 911.
   c. Turn OFF breaker to P-108.
   d. Direct appropriate fire monitors on surrounding equipment.
   e. Extinguish with dry chemical or CO_2.

6. Oil leak with Fire Inside Turbine Building.
   a. Depress nearest I-1 Shutdown.
   b. Notify Chattanooga Fire Department and Police by dialing 911.
   c. Block off Fuel Gas.
   d. Turn both AC and DC breakers off to Turbine.
   e. Direct fire monitor on outside of building <u>but not on leak or fire.</u>
   f. Extinguish fire with dry chemical.

7. Fire on or in Cooling Tower.
   a. Depress nearest I-1 Shutdown.
   b. Notify Chattanooga Fire Department and Police by dialing 911.
   c. Turn breakers off to Cooling Tower fans.
   d. Direct fire monitors on Cooling Tower Pumps.
   e. Turn off breakers to Cooling Tower Pumps.
   f. Isolate refrigerant loop in sections.
   g. Determine if there is refrigerant leak into cooling water.
   h. Vent section of refrigerant loop leaking to vent header.
   i. Extinguish fire in wood part of tower with water.
   j. Allow any refrigerant leak to burn and keep surrounding area wet.
   k. Do not drain water line, this would allow air to get into line and cause an explosive situation.

8. Electrical Fire at the Boil-Off Compressor
   a. Depress nearest I-1 Shutdown.
   b. Notify Chattanooga Fire Department and Police by dialing 911.
   c. Turn all electrical breakers off to Boil-off area.
   d. Extinguish any remaining fire with water, dry chemical or CO_2.

9. Oil Fire at Boil-Off Area.
   a. Depress nearest I-1 Shutdown.
   b. Notify Chattanooga Fire Department and Police by dialing 911.
   c. Turn all electrical breakers off to Boil-Off Compressor.
   d. Block off boil-off suction if possible.
   e. When Fire Department arrives, cool sides of LNG Tank and any affected piping.
   f. Extinguish fire.

10. Flange or Broken Line Leak with fire at Boil-off Compressor.
   a. Depress nearest I-1 Shutdown.
   b. Notify Chattanooga Fire Department and Police by dialing 911.
   c. Turn electrical breaker off to Boil-off.
   d. When Fire Department arrives, cool sides of LNG Tank and surrounding piping.
   e. Block off Boil-off suction.
   f. Block off downstream of leak or break.
   g. DO NOT EXTINGUISH, allow to burn out while keeping surrounding area cool.

11. LNG Leak and Fire at LNG Tank.
   a. Depress nearest I-1 Shutdown.
   b. Notify Chattanooga Fire Department and Police by dialing 911.
   c. Turn off electrical breakers to Boil-off LNG Pumps.
   d. When Fire Department arrives, direct water on sides of Tank and piping.
      DO NOT PUT WATER ON LNG.
   e. Block all penetration valves if possible.
   f. If high expansion foam is available, cover spill and fire with foam and move spill away from container.
   g. After leak has been stopped, keep Tank, lines and equipment cool while determination is made to extinguish fire or not.

12. Electrical fire in Motor Control Center. (MMC)
   a. Depress nearest I-1 Shutdown.
   b. Notify Chattanooga Fire Department and Police by dialing 911.
   c. If possible, throw the Main breaker.
   d. Use CO2 if available to extinguish fire. If CO2 is not available, use dry chemical.

13. Fire at Transformers.
   a. Depress nearest I-1 Shutdown.
   b. Notify Chattanooga Fire Department and Police by dialing 911.
   c. Call the Electric Power Board (423-629-3244) to the effect of the fire;
      Ask for disconnection at 3401 North Hawthorne Street.
   d. Direct fire monitor on building to keep cool.
   e. Extinguish fire with dry chemical.

14. Fire in Storage Building.
   a. Notify Chattanooga Fire Department and Police by dialing 911.
   b. Turn electrical power off to buildings.
   c. Direct fire monitors onto buildings.
   d. Extinguish with dry chemical and then soak with water.
   e. If needed, Shut Plant down.

15. Leak with fire at Meter Station.
   a. Depress nearest I-1 Shutdown.
   b. Notify Chattanooga Fire Department and Police by dialing 911.
   c. Block off our outgoing and incoming lines at driveway east of the plant.
   d. Allow leak to burn, cooling piping with Fire Departments water.
   e. CGC will close valve appropriate to these lines.
   f. Allow leak to burn out and protect surrounding facilities and objects.

ATLANTA GAS LIGHT COMPANY
CHATTANOOGA LNG PLANT

LNG PLANT EMERGENCY PROCEDURE

FIRE IN PROCESS AREA

1. Depress nearest Emergency Shutdown Button.

2. Notify Fire Department by dialing 911.

3. Notify Atlanta Gas Light Central by Telephone @ 1-404-584-4477 or CGC Radios. Notify Plant Supervisor Chris Young.

4. Make sure Flare Pilot is burning.

5. Open GREEN Valves and GREEN/ORANGE Valves, Close RED Valves.

a. Vent Refrigeration system to flare.
Open Green/Orange Valves.

b. Close Natural Gas Inlet and Outlet Block Valves.
Close RED Valves and Vent Natural Gas Headers.
Open GREEN Valves.

c. Close Boiler Fuel Gas Valve.
Close RED Valve.

d. Close all Block Valves to LNG Storage Tank.
Close RED Valves.

6. COOL affected equipment with Water.

7. Attempt to extinguish fire.

8. Residential Alarm must be sounded in the event that the fire is endangering the LNG Storage Tank.

Revised 5/27/2000 DC

ATLANTA GAS LIGHT COMPANY
CHATTANOOGA LNG PLANT

LNG PLANT EMERGENCY PROCEDURE

LNG SPILL

1. Depress nearest Emergency Shutdown Button.

2. Notify Fire Department by dialing 911.

3. Notify Atlanta Gas Light Central by telephone @ 1-404-584-4477 or CGC Radios. Notify Plant Supervisor Chris Young.

4. Sound Residential Alarm.

5. Make sure Flare Pilot is extinguished.

6. Close RED Valves, Open GREEN Valves.
   Close Natural Gas Inlet and Outlet Block Valves.
   Close RED Valves and Vent Natural Gas Headers.
   Open GREEN Valves.

7. Close all Block Valves to LNG Storage Tank.
   Close RED Valves.

Revised 5/27/2000 DC

ATLANTA GAS LIGHT COMPANY
CHATTANOOGA LNG PLANT

LNG PLANT EMERGENCY PROCEDURE

BRUSH FIRE AWAY FROM PROCESS AREA

1. Depress nearest Emergency Shutdown Button.

2. Notify Fire Department by dialing 911.

3. Notify Atlanta Gas Light Central by Telephone @ 1-404-584-4477 or CGC Radios. Notify Plant Supervisor Chris Young.

4. Attempt to extinguish fire.

5. If fire cannot be controlled, follow procedures under " Fire in Process Area" Starting with Step #4.

6. Residential Alarm must be sounded in the event that the fire is endangering the LNG Storage Tank.

Revised 5/27/2000 DC

APPENDIX F

BED SHIFT DATA

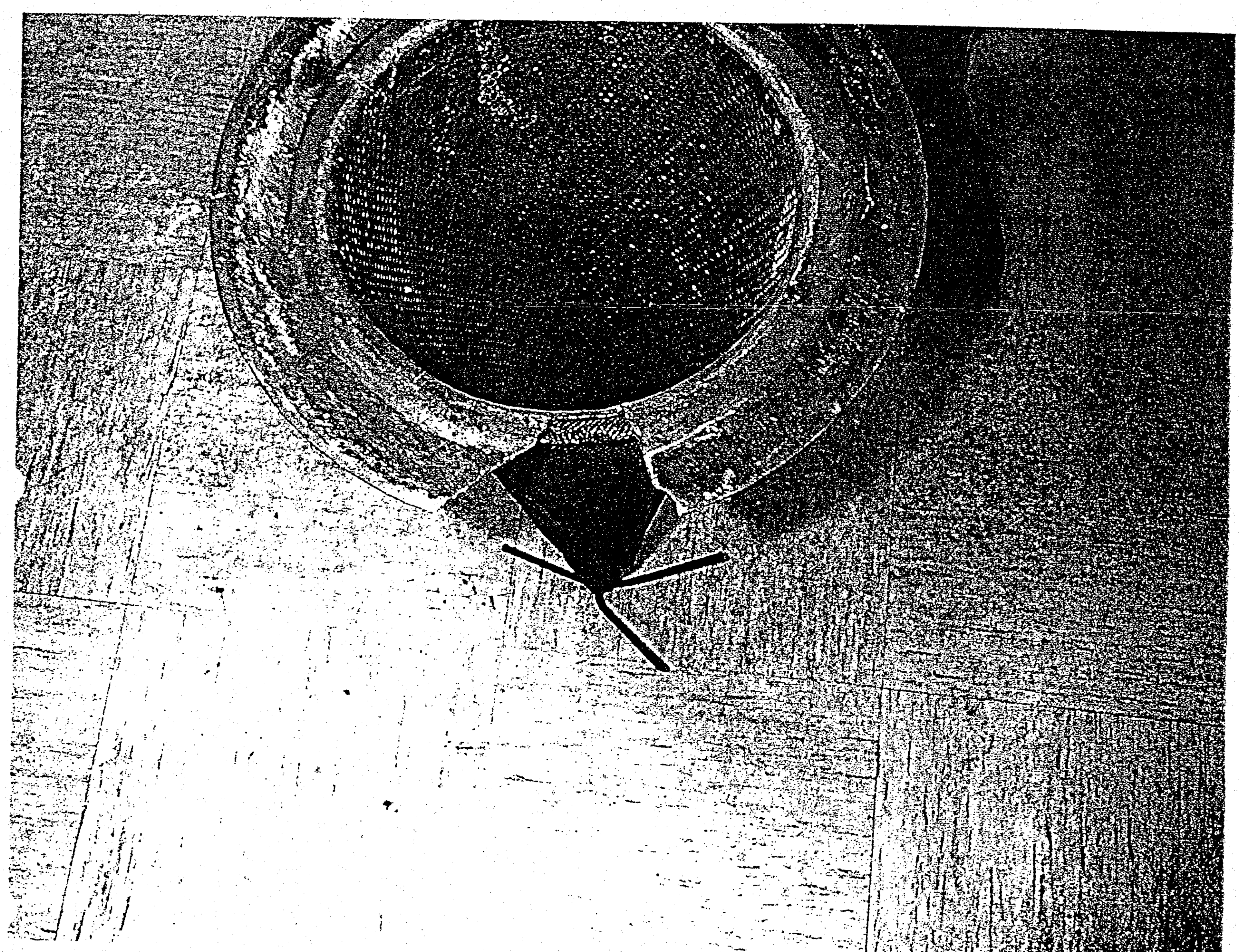
EQUIPMENT	TIME OF BED SHIFT	7:20	8:50	10:20	11:50	13:20	14:50	16:20	17:50	19:20
REGEN GAS TO E-101 TEMPERATURE		515	510	510	500	500	500	500	500	495
FEED GAS TO REFRIGERANT EXCHANGER TEMPERATURE		80	80	80	80	85	85	90	85	80
REGEN GAS TO DEHYDRATORS TEMPERATURE		550	550	550	550	550	550	550	550	550
REGEN GAS TO TURBINE HEAT EXCHANGER TEMPERATURE		130	130	135	140	150	145	130	150	155
FEED GAS FLOW ROOTS		6.2	6.2	6.3	6.3	5.1	5.8	5.6	5.6	5.7
CO2 PPM		12	13	15	17	14	22	18	13	30
AVERAGE REGEN FLOW ROOTS		7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4
INLET PRESSURE TO DEHYDRATORS		230	230	230	230	230	230	230	230	230

APPENDIX G

PHOTOGRAPHS SUBMITTED BY AGL

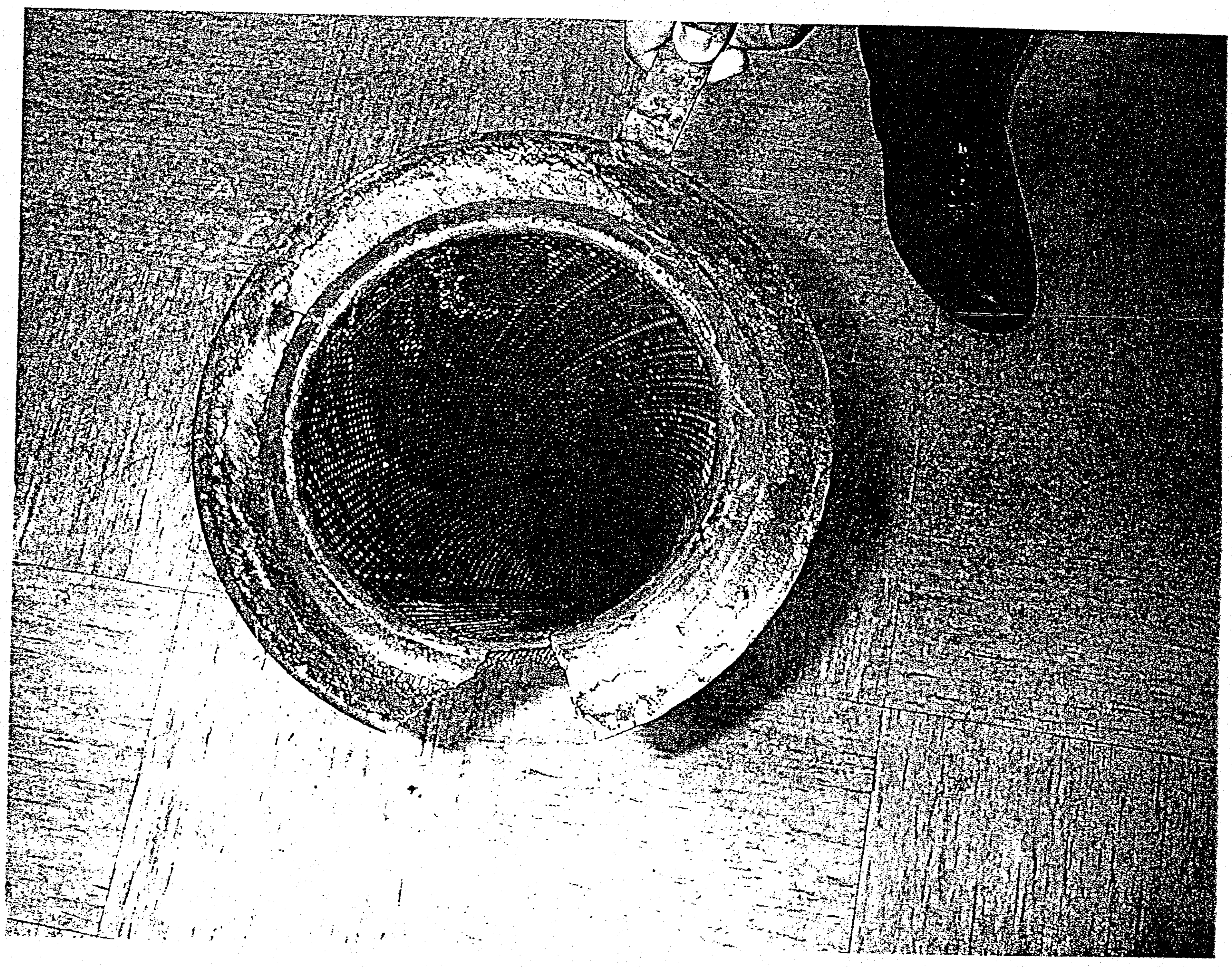
Attachment B

Photograph of failed witch's hat strainer



Attachment C

Photograph of failed witch's hat strainer



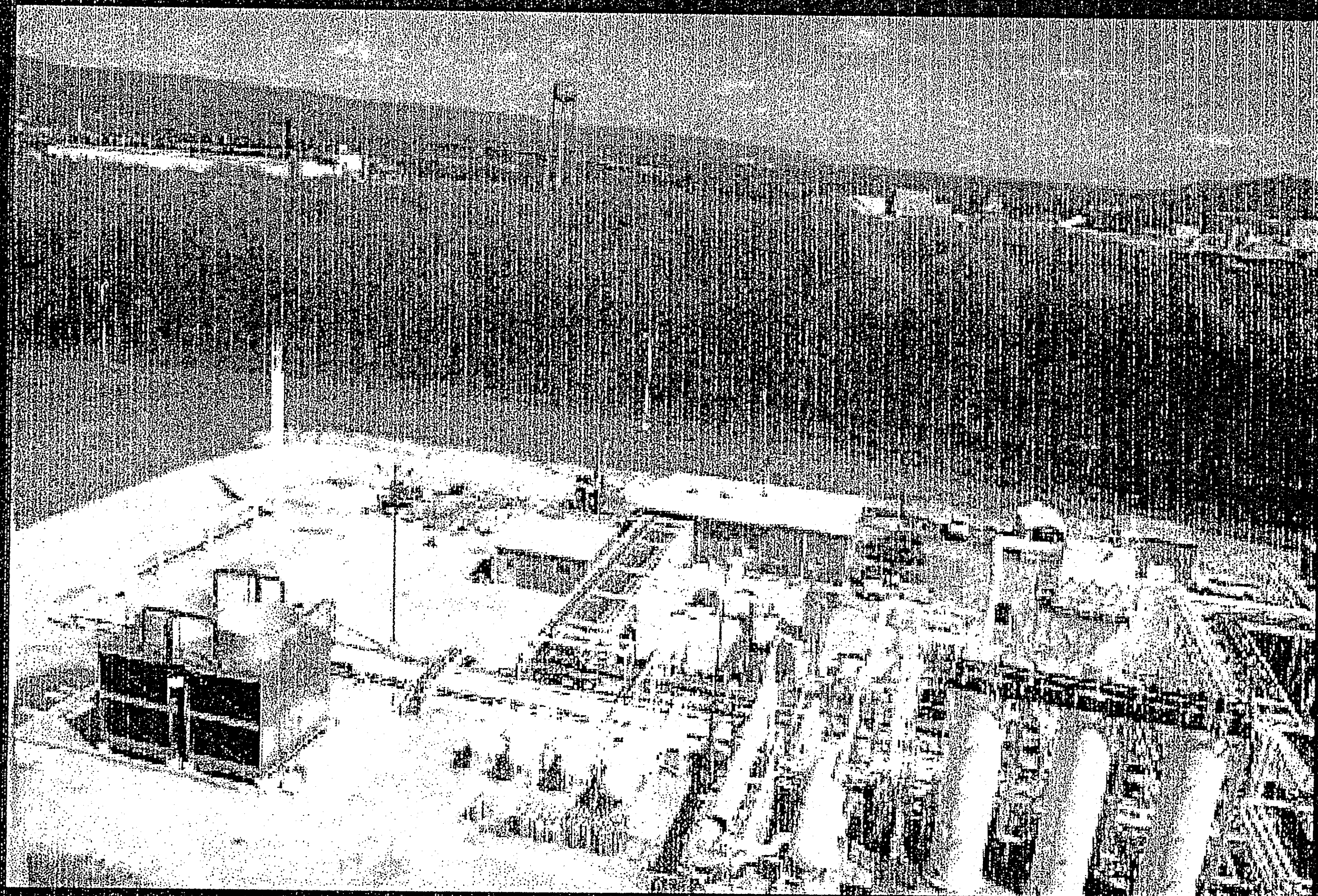
Attachment D

Photographs depicting fire damage to Chattanooga Gas LNG plant.

AGL – CHATTANOOGA GAS

Chattanooga Gas Company Part of the AGL System

AGL – CHATTANOOGA GAS



View of Yard Before Fire

AGL – CHATTANOOGA GAS

Burn Path As Seen From Above

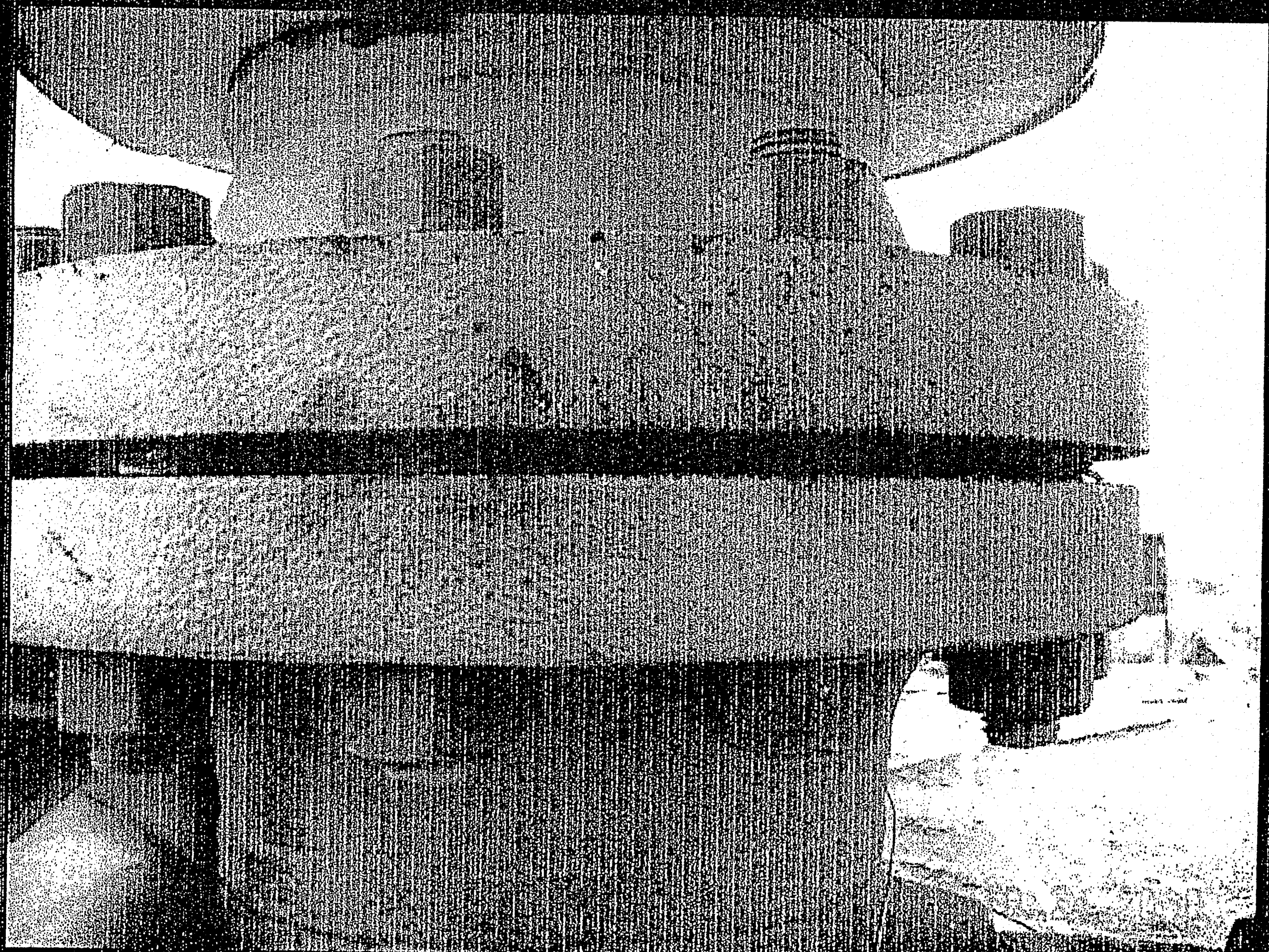
AGL – CHATTANOOGA GAS

Control Wiring Damaged by Intense Heat of Fire

AGL – CHATTANOOGA GAS

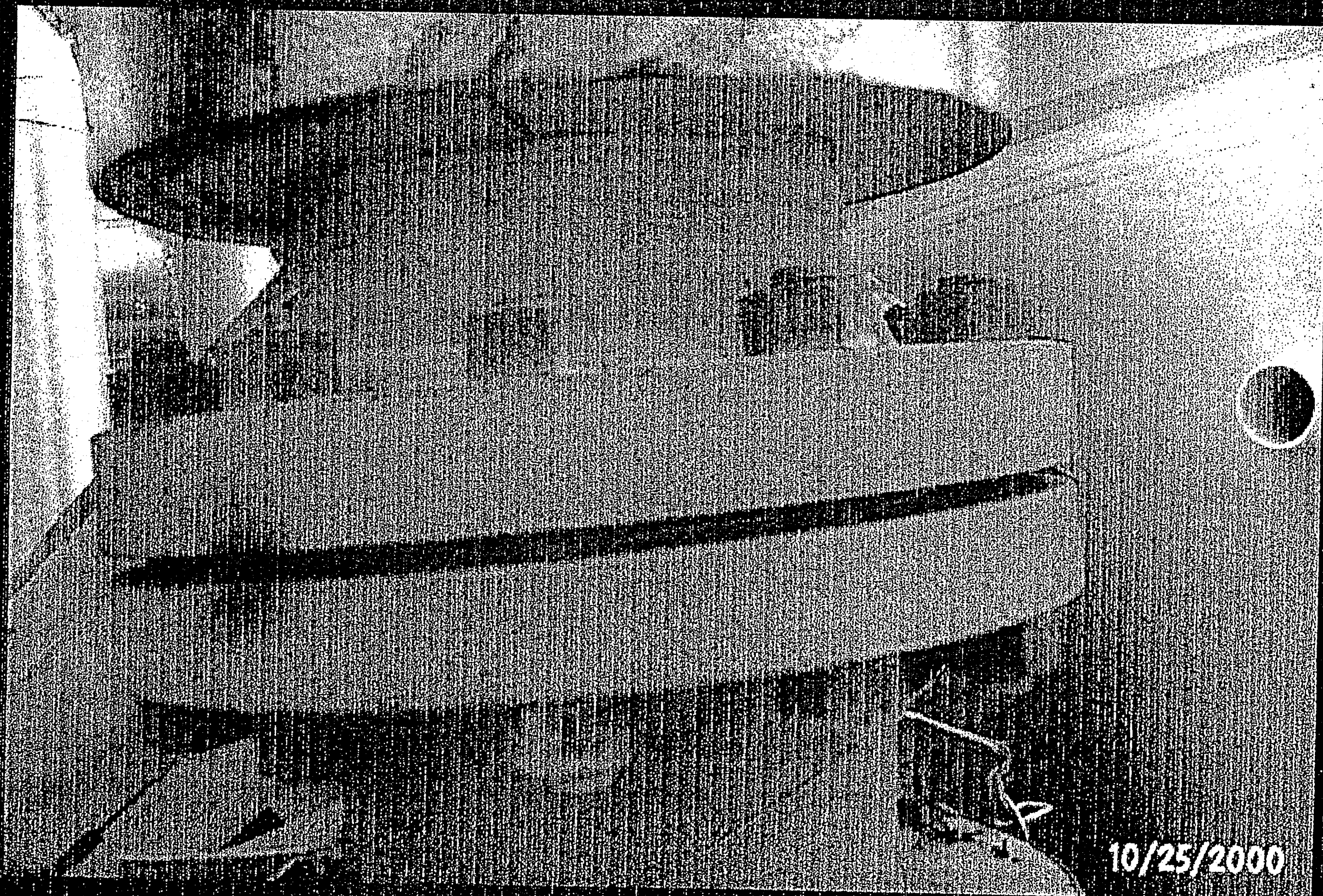
Wiring Trays and All Control Wiring Burned by Heat

AGL – CHATTANOOGA GAS



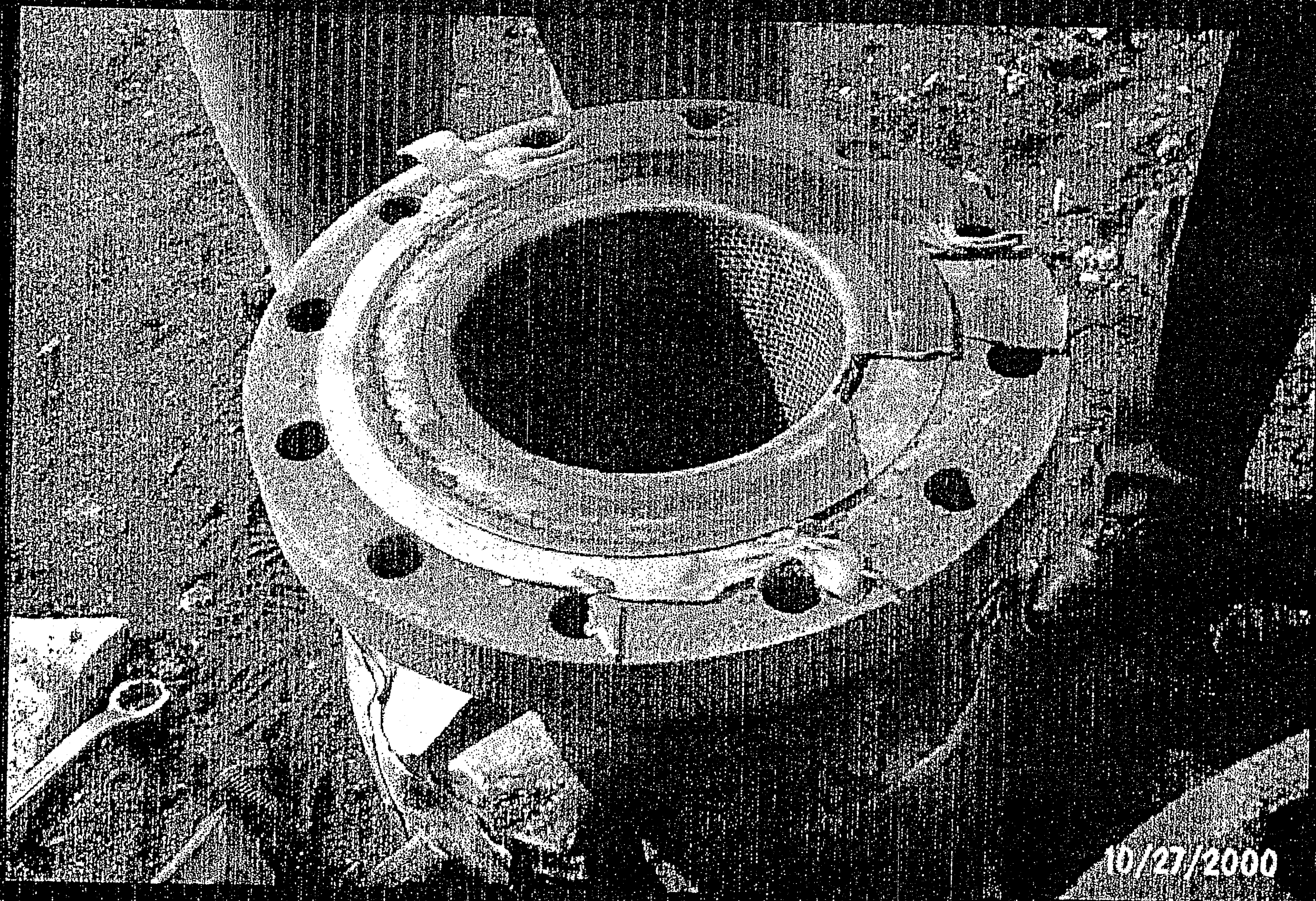
Preliminary Area of Origin

AGL – CHATTANOOGA GAS



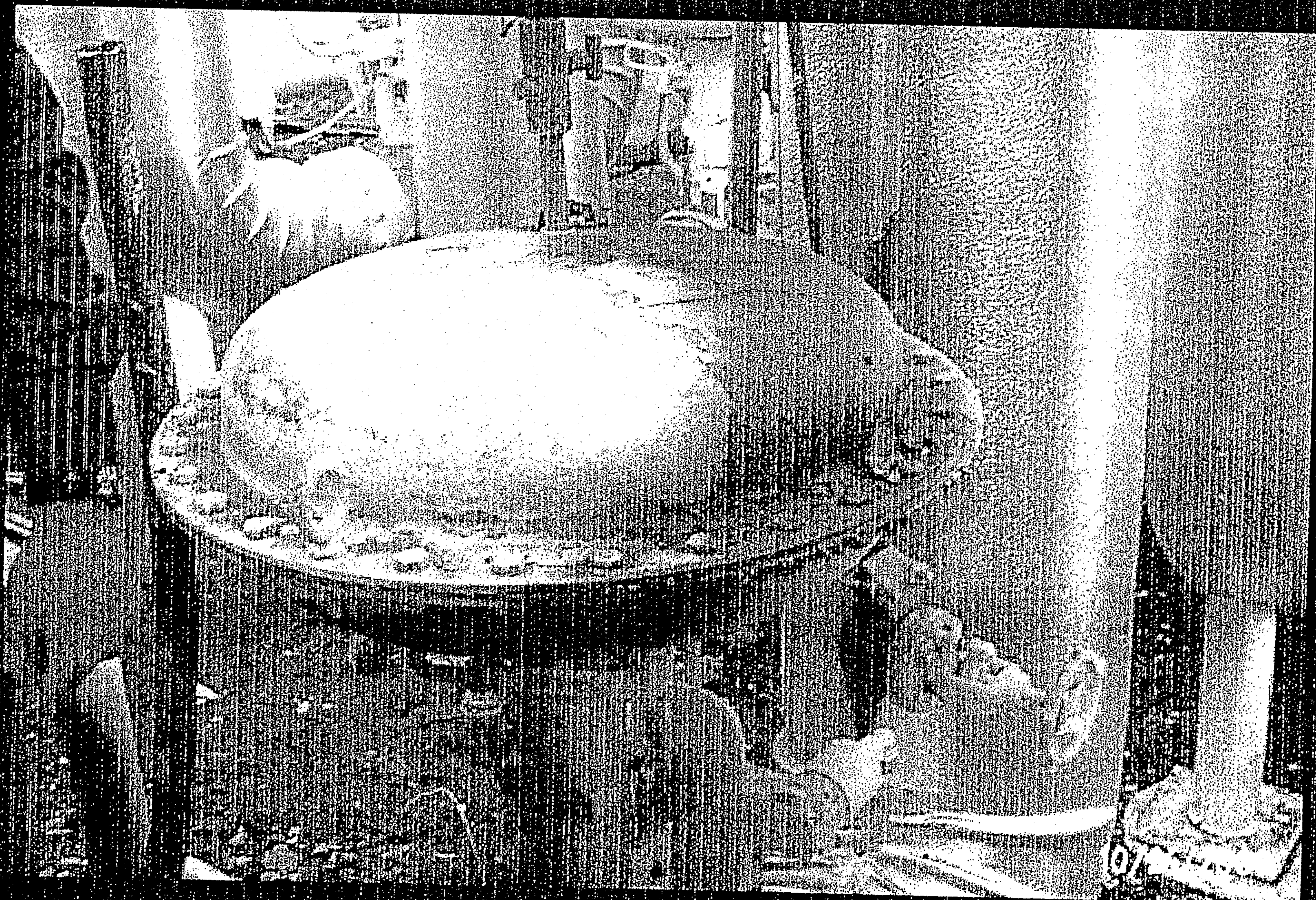
Seal Between Coupling Flange is Suspected of Failing

AGL – CHATTANOOGA GAS



Coupling Disassembled Reveals Broken Gasket & Fractured Strainer

AGL – CHATTANOOGA GAS

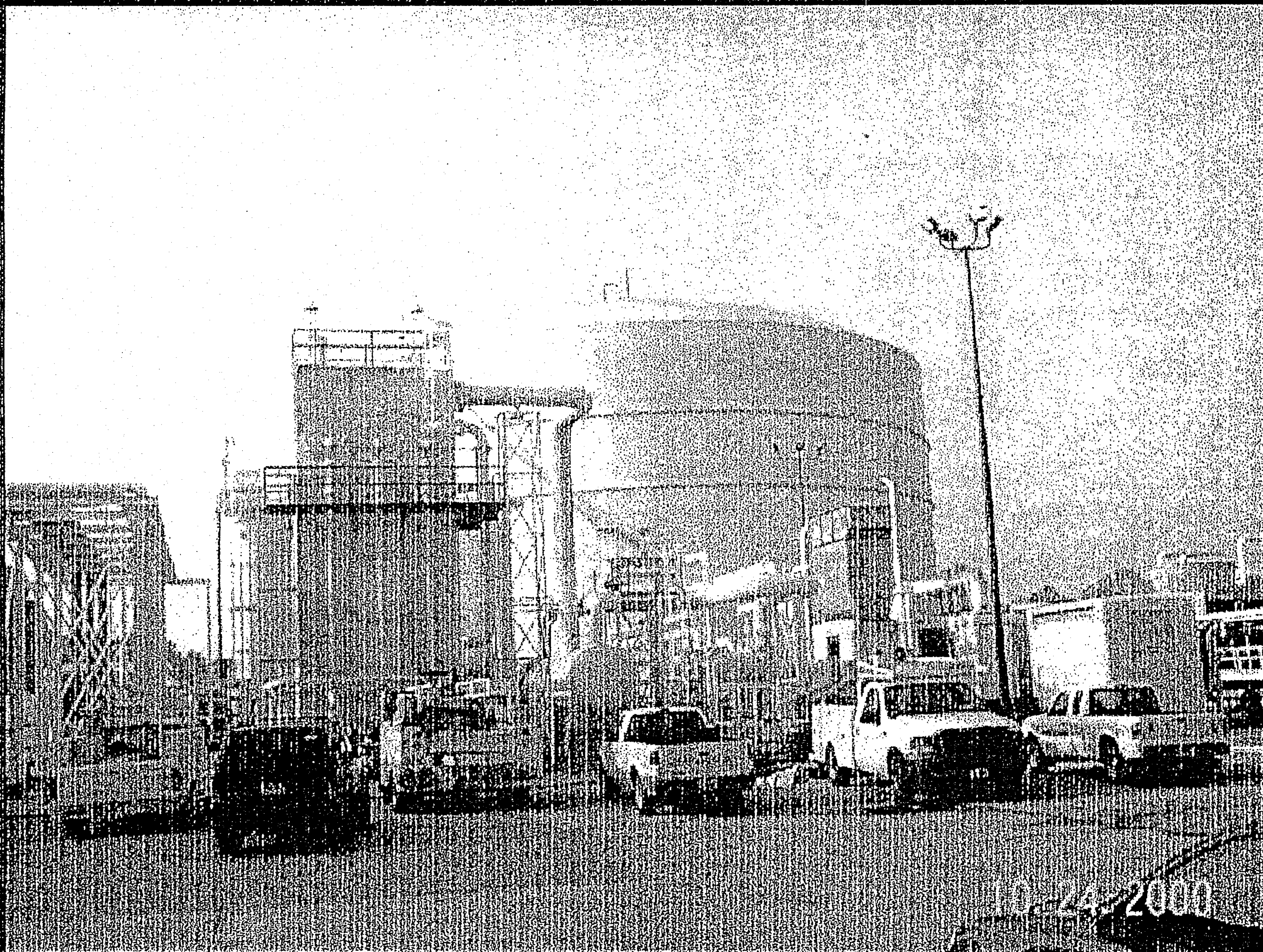


One of Several Orbit Valves Damaged or Destroyed by Heat

AGL – CHATTANOOGA GAS

Impact Area

AGL – CHATTANOOGA GAS



Workman On-Site Making Repairs Day After Fire

APPENDIX H

PIPE, STRAINER, AND CONDUIT ANALYSIS: APPLIED TECHNICAL SERVICES, INCORPORATED

APPLIED TECHNICAL SERVICES, INCORPORATED

ISO 9002
PERFORMANCE REVIEW INSTITUTE
REGISTERED FIRM

1190 Atlanta Industrial Drive
Marietta, Georgia 30066
(770) 423-1400
Fax # (770) 424-6415

Augusta, Georgia
Savannah, Georgia
Greenville, South Carolina
Winston-Salem, N. Carolina
Chesapeake, Virginia

FAILURE ANALYSIS OF PIPE, STRAINER AND CONDUIT LINE

ATS JOB # D 11453

PURCHASE ORDER # VERBAL - NORTHRUP

Prepared for

MR. GARY NORTHRUP
ATLANTA GAS LIGHT COMPANY
12860 EAST CHEROKEE DRIVE
BALL GROUND, GEORGIA 30107

*Prepared by*____
James F. Lane, P.E., Metallurgist

*Approved by*____
Semih Genculu, P.E., Manager

APPLIED TECHNICAL SERVICES, INCORPORATED

1190 Atlanta Industrial Drive, Marietta, Georgia 30066 • (770) 423-1400 Fax (770) 424-6415

CERTIFIED TEST REPORT

Ref. D 11453 **Date:** December 18, 2000

Purchase Order # Verbal - Northrup

Mr. Gary Northrup
Atlanta Gas Light Company
12860 East Cherokee Drive
Ball Ground, Georgia 30107

Subject

Failure Analysis of Pipe, Strainer and Conduit Line

Material

Carbon and Stainless Steel

Objective and Background

All three specimens supplied to our laboratory were involved in a fire. The analysis was performed to determine whether the failures were the result of the fire or were present prior to the fire.

Test Procedure and Results

The components were photographed to document the as-received condition. The witch's hat strainer (strainer) had a section of the flange missing and cracks in two other locations. The pipe section (pipe) had a fish mouth rupture in the center of the approximately six foot long section, and the conduit tube (tube) was fractured into two pieces. Representative photographs are presented in Figures 1 through 10.

The screen mesh was removed from the strainer to expose the underlying perforated face. The locations of the fractures were documented and photographed (Figures 11 through 17). Each of the cracks and the region with the missing section of flange were removed from the strainer using a dry abrasive cut-off wheel. The two cracks were then back-cut and opened to expose the fracture surfaces. These surfaces and those adjacent to the missing section were examined at low magnification (3X to 40X) using a stereomicroscope. A portion of each fracture, near the bend section of the flange, contained a flat, relatively featureless surface with faint crack arrest lines (beach marks). These marks—illustrated in Figure 18—are indicative of progressive crack growth, i.e. fatigue.

A metallographic cross-section was prepared in accordance with ASTM E 3, *Standard Practice for Preparation of Metallographic Specimens*, through the fracture surface at the base of the flange. The section revealed porosity, lack of penetration and numerous cracks through the weldment initiating from these defects (Figure 19).

The fracture surface on one half of the conduit was sectioned from the tube and cleaned. The fracture surface was examined using the stereomicroscope and the morphology was relatively non-descript. In cross-section, the surfaces of the fracture and the sides of the tube (both interior and exterior) were covered with a scale formation and a layer of molten copper (Figures 20 through 22). The fracture surface was intergranular in nature. The scale thickness on the outer and inner surface of the tube were much thicker than on the fracture surface, indicating that the fracture was exposed to elevated temperatures for a shorter period of time. Also, liquid metal embrittlement was observed on the surfaces, where molten copper had infiltrated the carbon steel along the grain boundaries (Figure 23).

The fish mouth fracture on the pipe had thinned material at the rupture, suggesting that the pipe had been exposed to a localized, high temperature while under pressure. A cross-section was prepared through the edge of the rupture and through the wall on the opposite side of the pipe. The interior surface of both samples contained a heavily carburized layer, indicating that the partial pressure of the gas within pipe and the elevated temperature produced a carburizing atmosphere within the pipe (Figures 24 and 25). The microstructure was different in each sample. The rupture-side specimen contained a predominantly pearlitic structure with same ferrite along the prior austenite grain boundaries. The undamaged-side specimen contained a mixture of ferrite and pearlite (Figures 26 and 27). The grain size in the undamaged area was much smaller than that observed in the rupture specimen.

Discussion and Conclusions

The conduit tube and pipe section both failed during the fire, while the witch's hat strainer contained cracks prior to the event. The conduit failed due to liquid metal embrittlement associated with the molten copper from the melted wires contained within and the pipe section failed due to short term overheating.

The strainer developed fatigue cracks in the welds where the flange was attached to the perforated cone section. The welds contained numerous defects, including porosity and lack of fusion, which acted as initiation sites for fatigue cracks. These cracks propagated to critical lengths by cyclical loading (most likely due to vibration or thermal cycling), at which time a catastrophic failure occurred—i.e. the fractured section was separated from the flange.

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CERTIFIED TEST REPORT

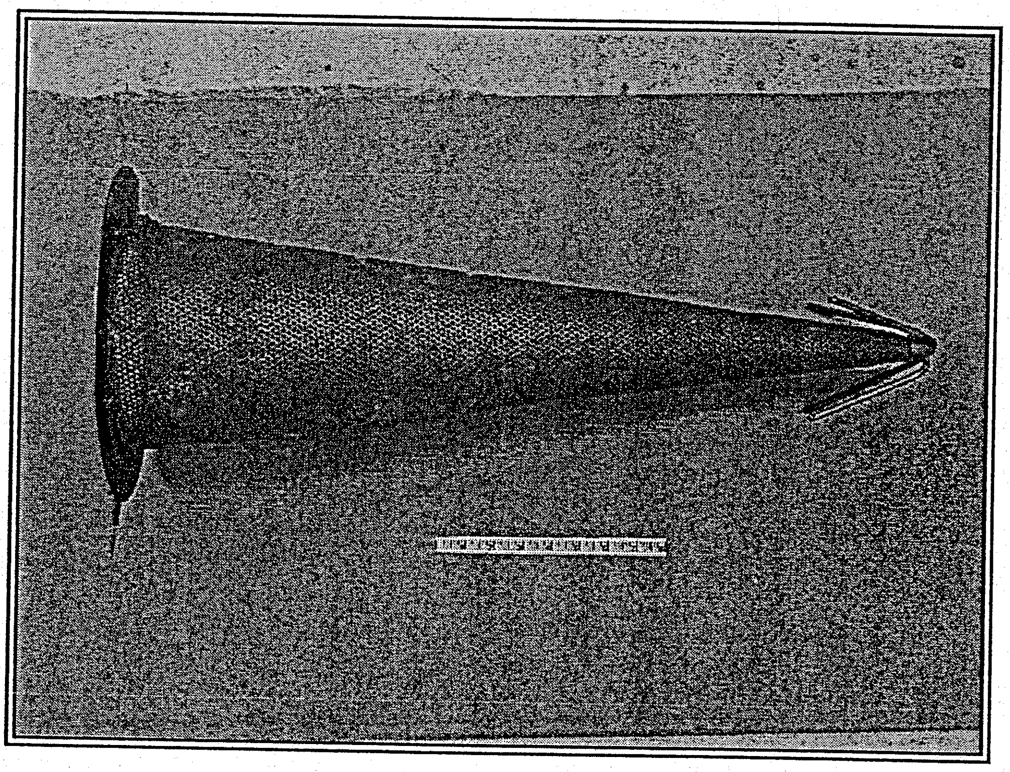

Figure 1: Photograph of the witch's hat strainer

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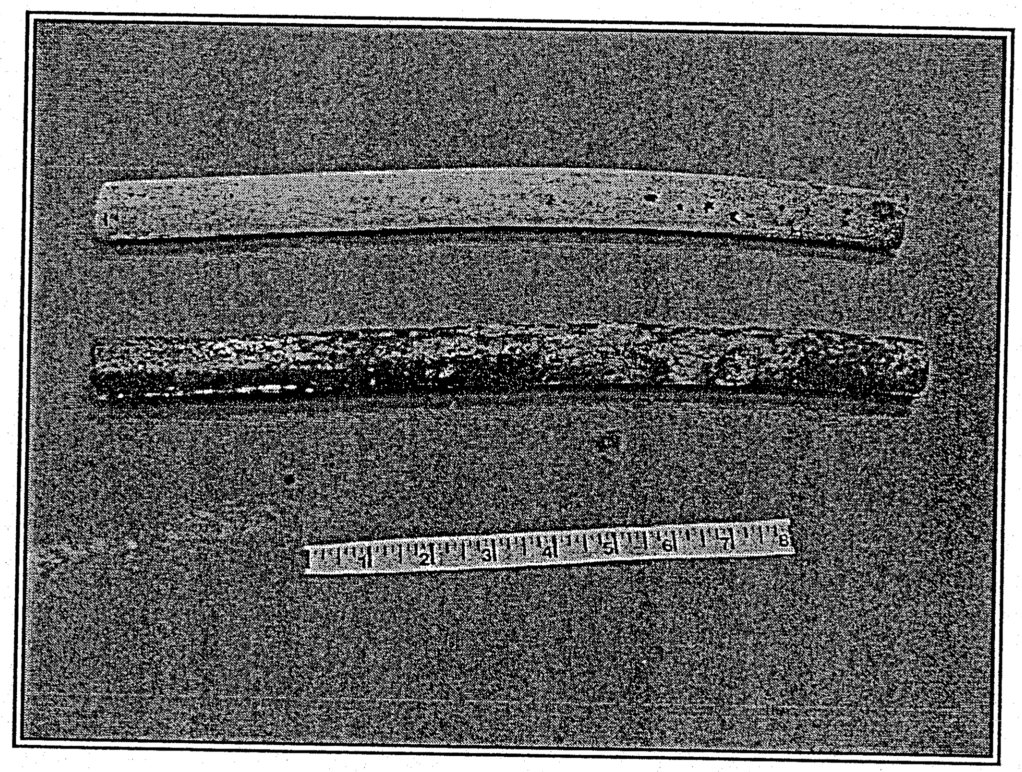

Figure 2: Photograph of the conduit tube

Figure 3: Photograph of the pipe section

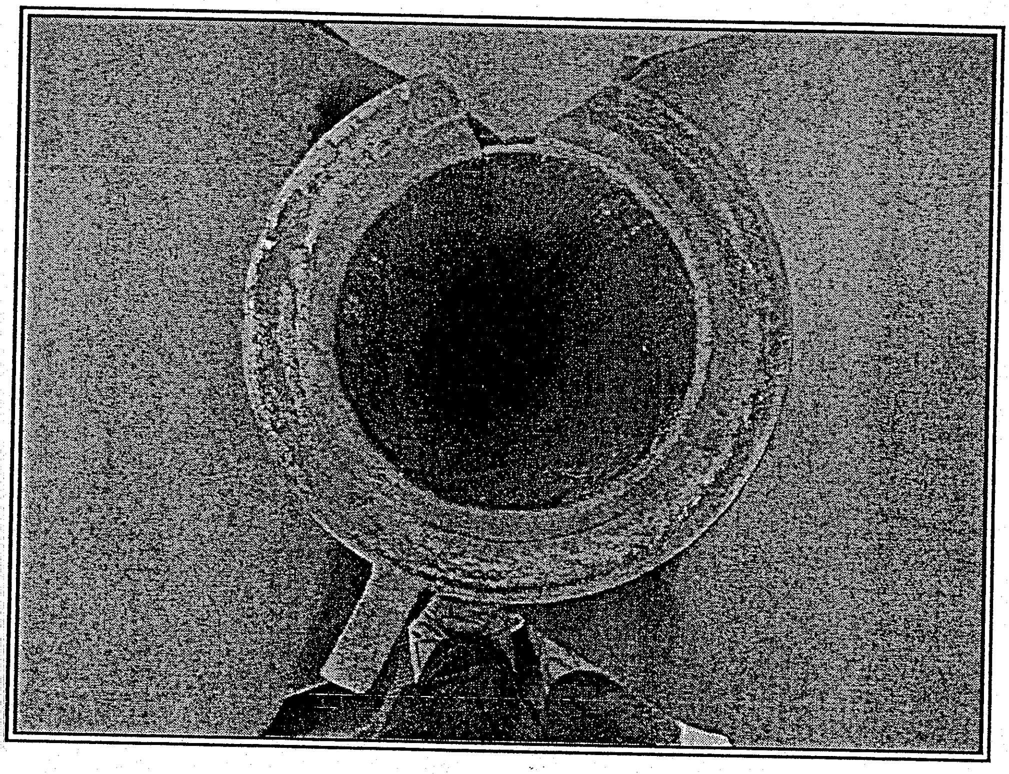

Figure 4: Photograph of the witch's hat strainer showing the bottom flange section

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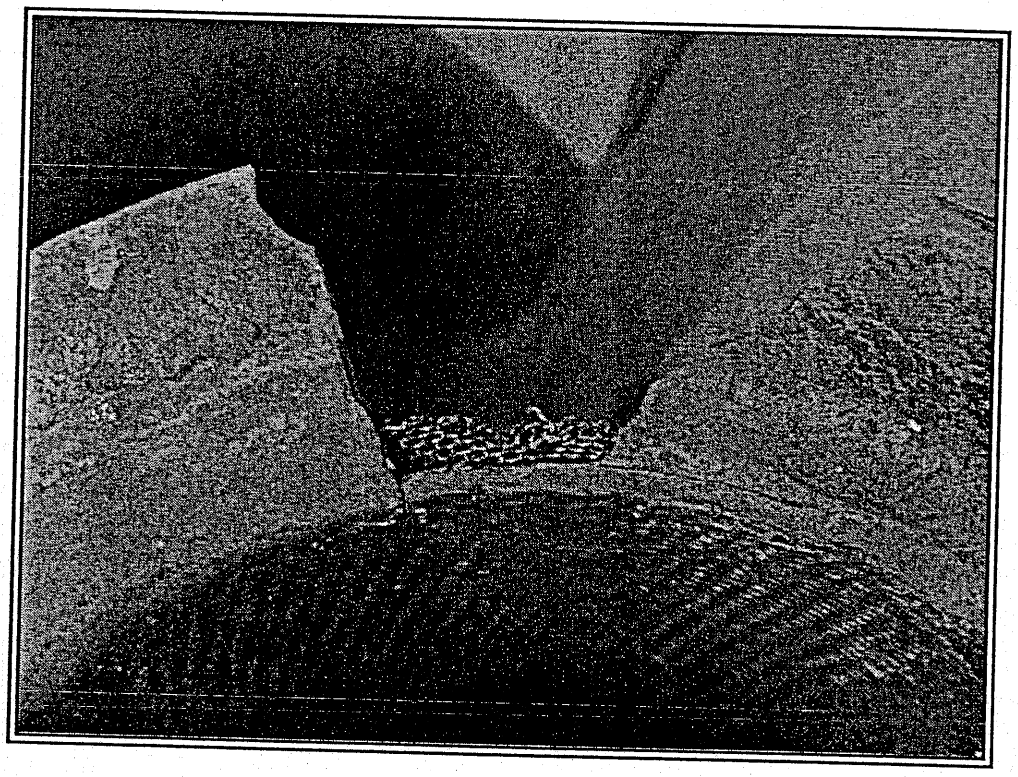


Figure 5: Photograph of the witch's hat strainer showing the section that was separated due to fatigue crack propagation

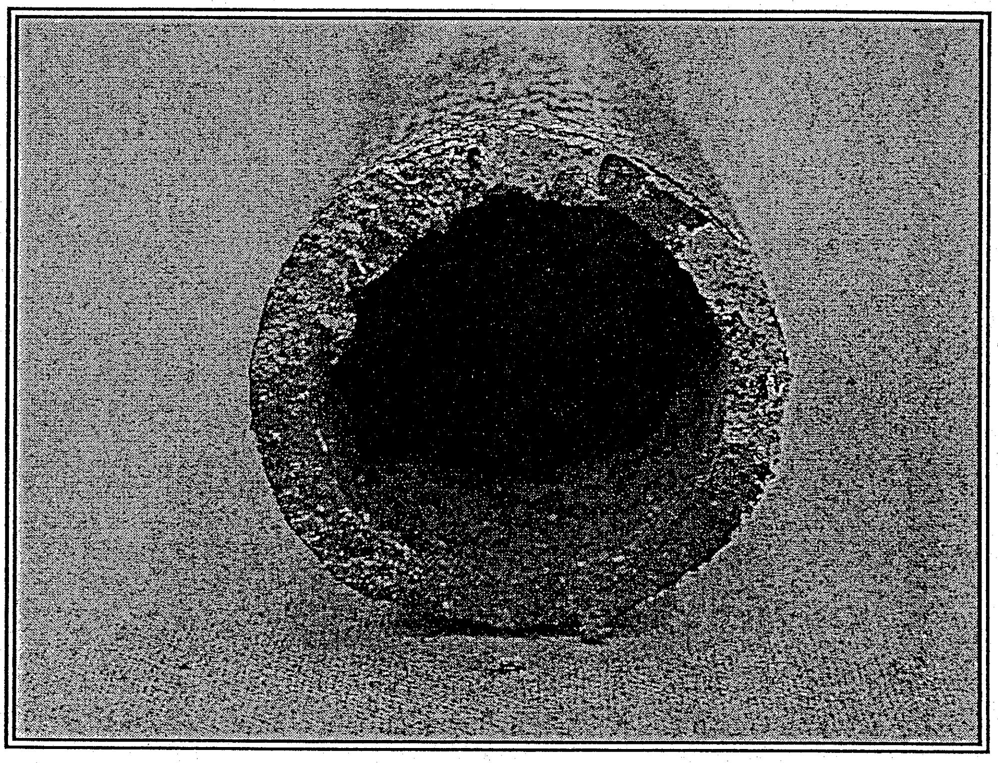


Figure 6: Photograph of the fracture surface on the end of the conduit tube

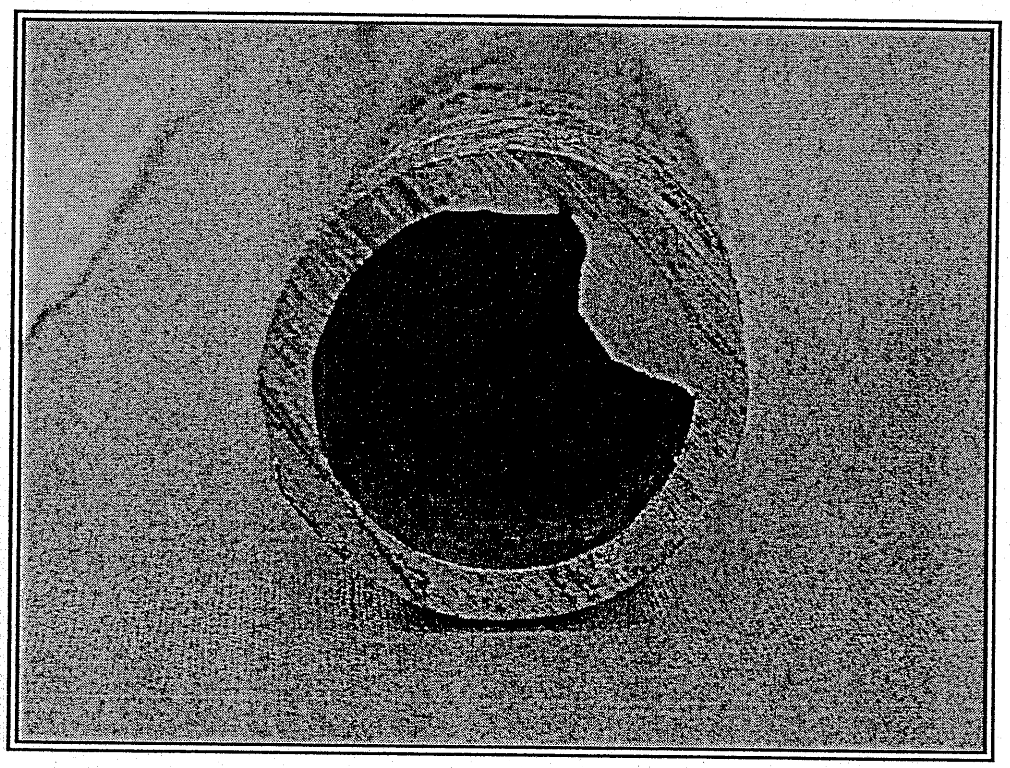


Figure 7: Photograph of the melted copper inside the conduit tube

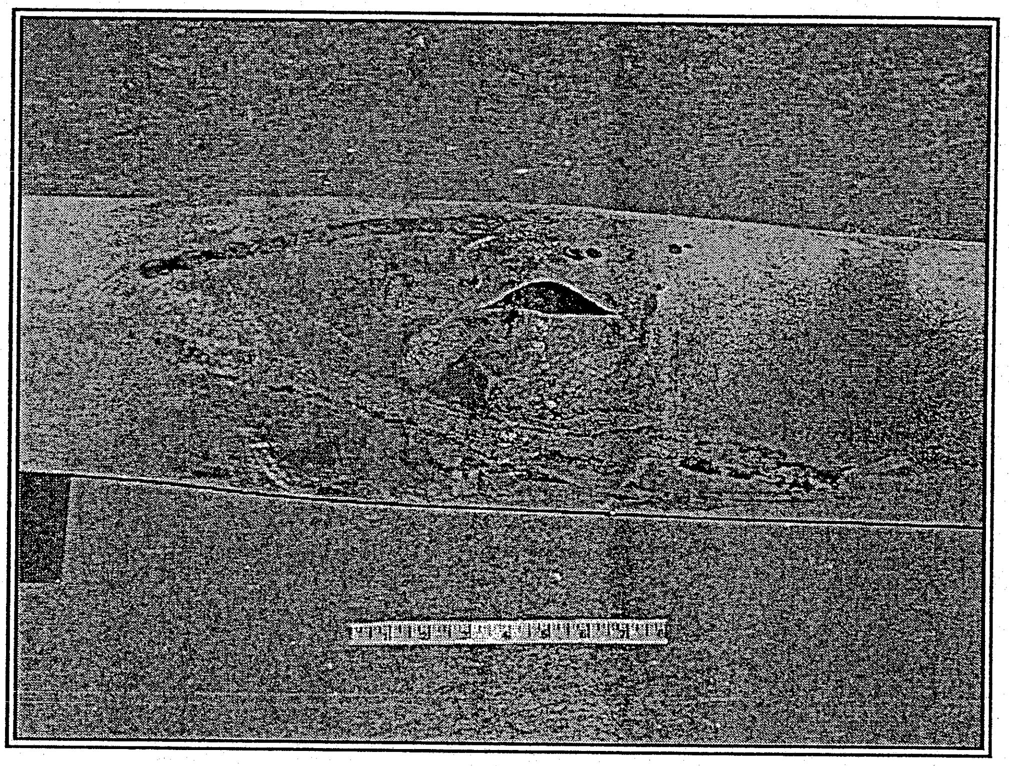


Figure 8: Photograph of the fish mouth region on the pipe section

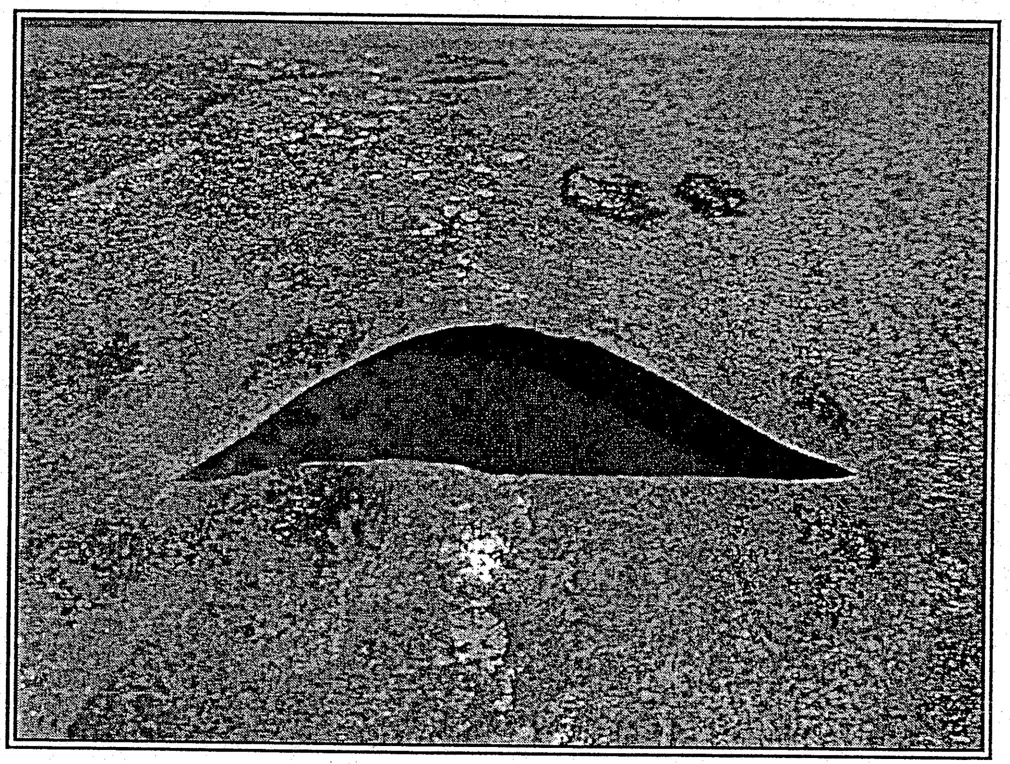


Figure 9: Photograph of a close-up view of the fish mouth region

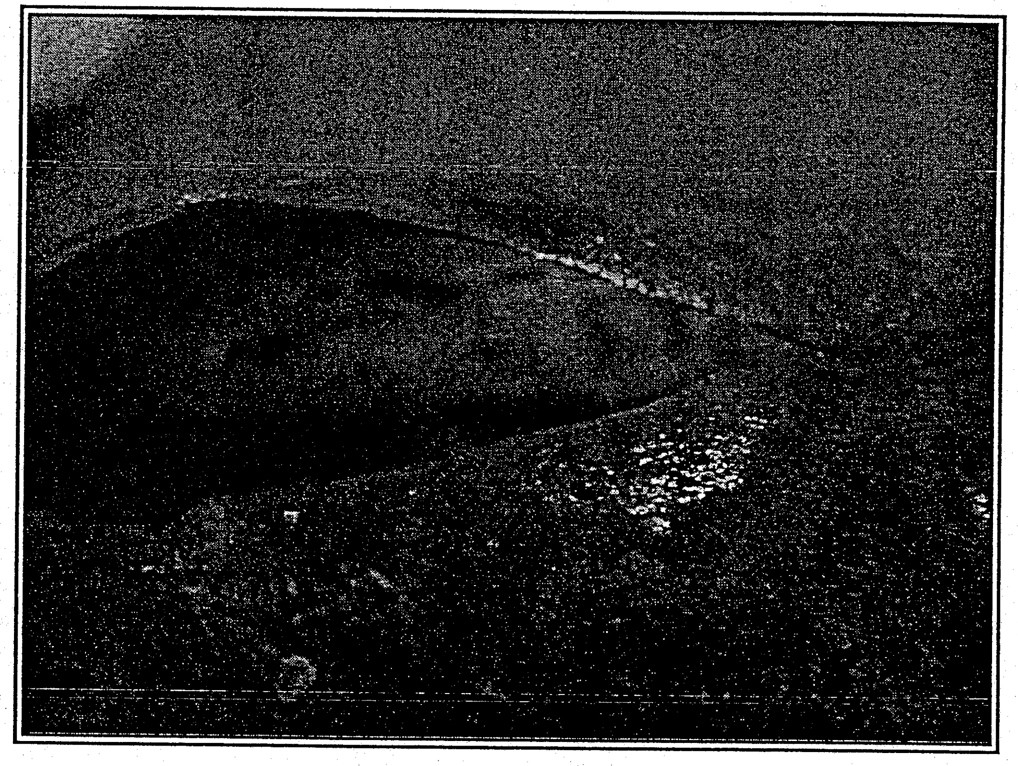


Figure 10: Photograph of the thin-lipped fish mouth region

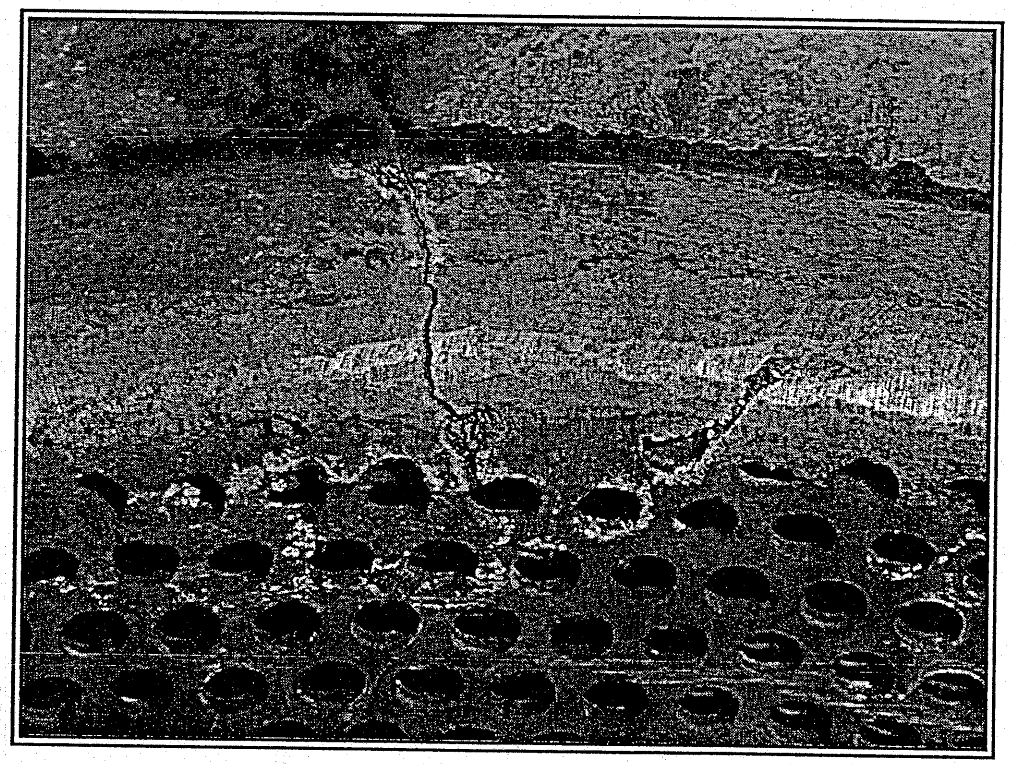


Figure 11: Photograph of the flange cracks in the witch's hat strainer

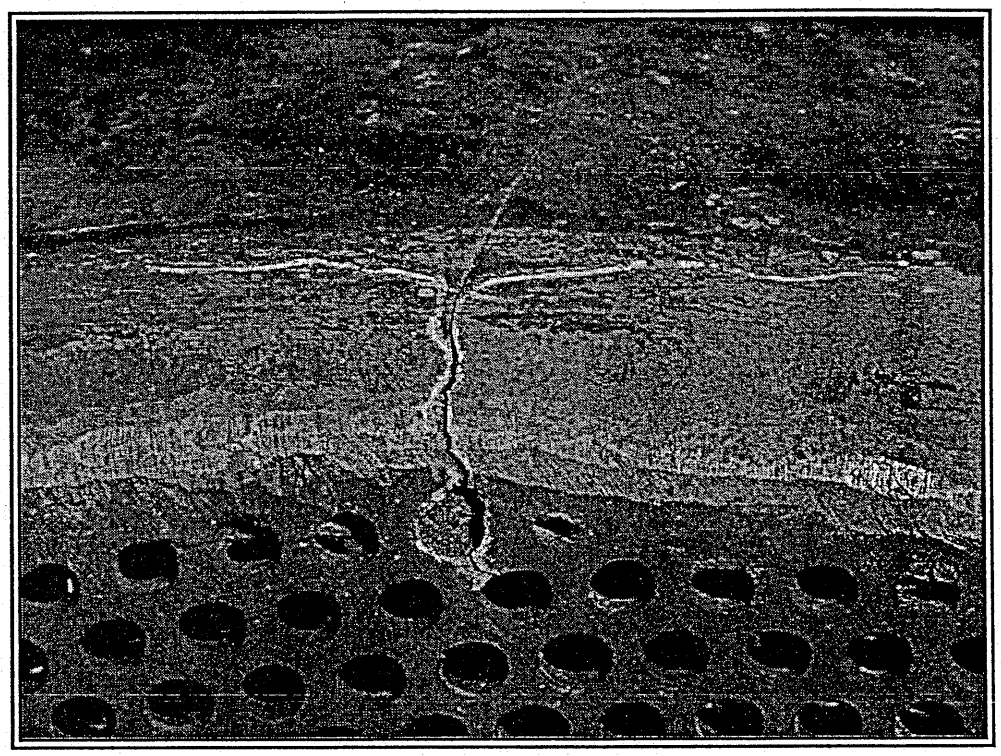


Figure 12: Photograph of the flange cracks in the witch's hat strainer

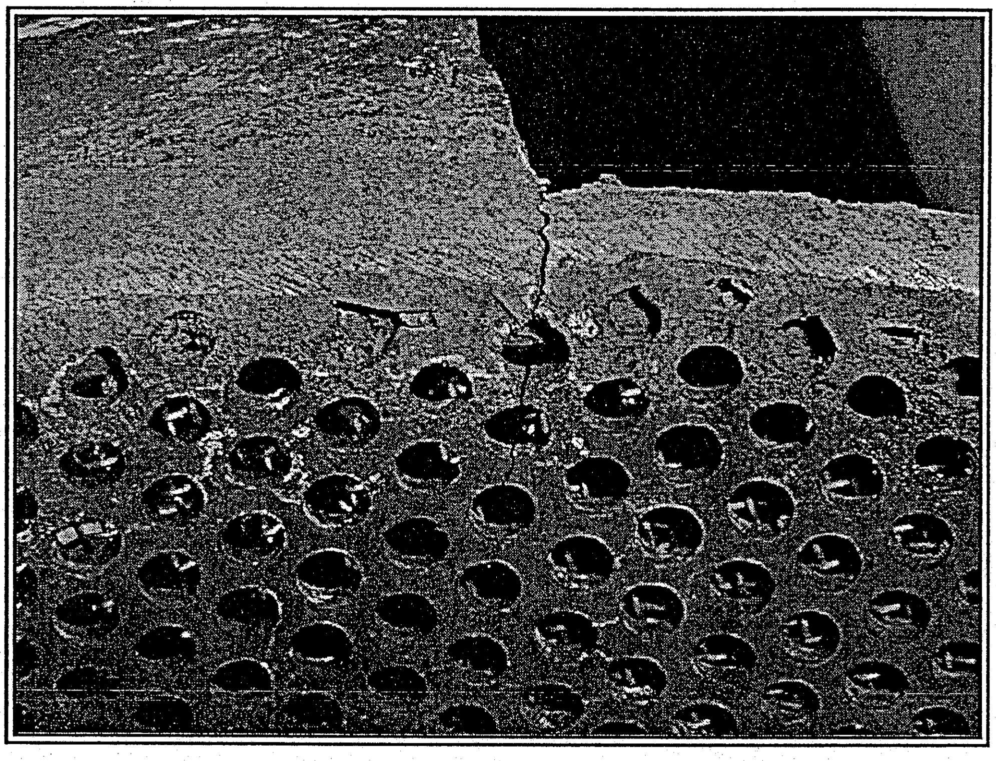


Figure 13: Photograph of the flange cracks in the witch's hat strainer

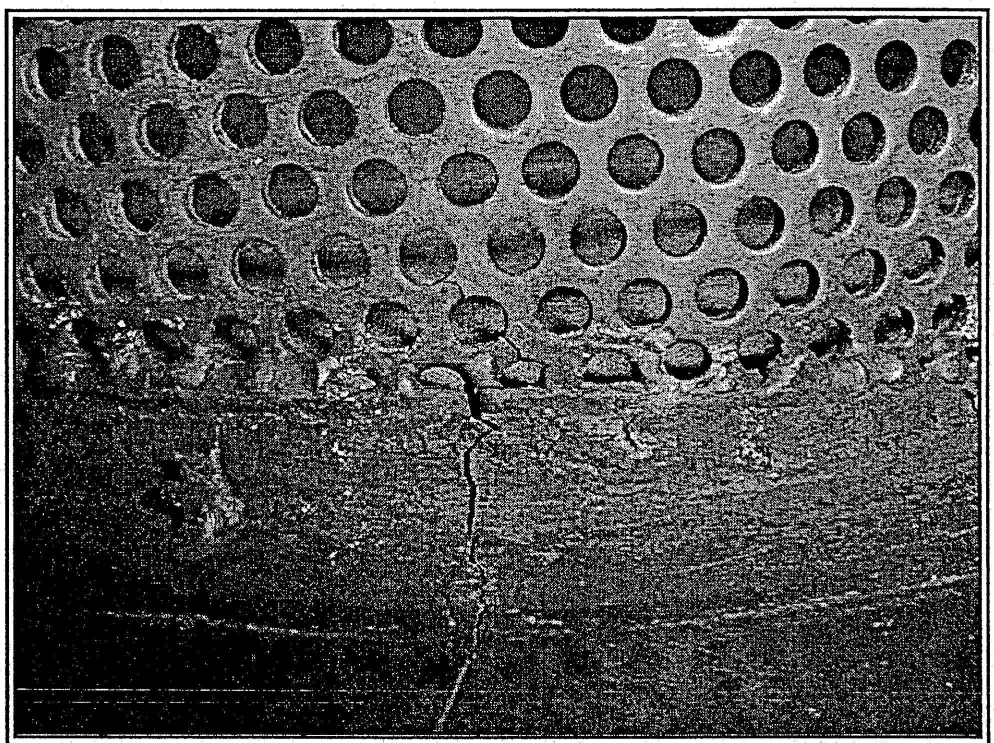


Figure 14: Photograph of the flange cracks in the witch's hat strainer

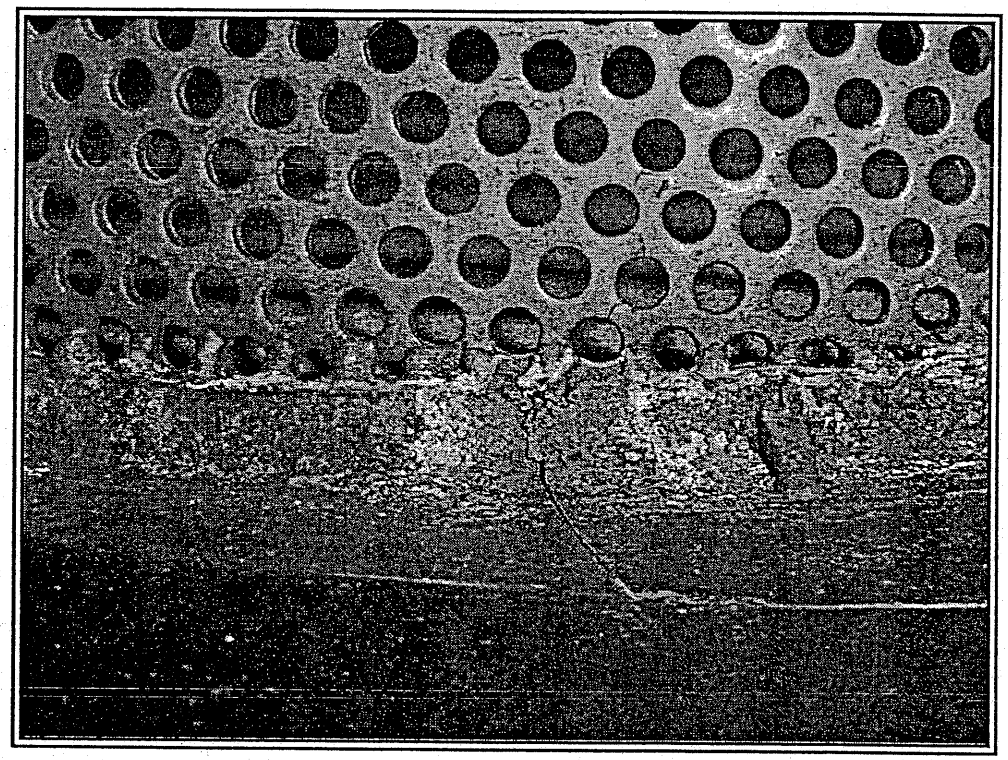


Figure 15: Photograph of the flange cracks in the witch's hat strainer

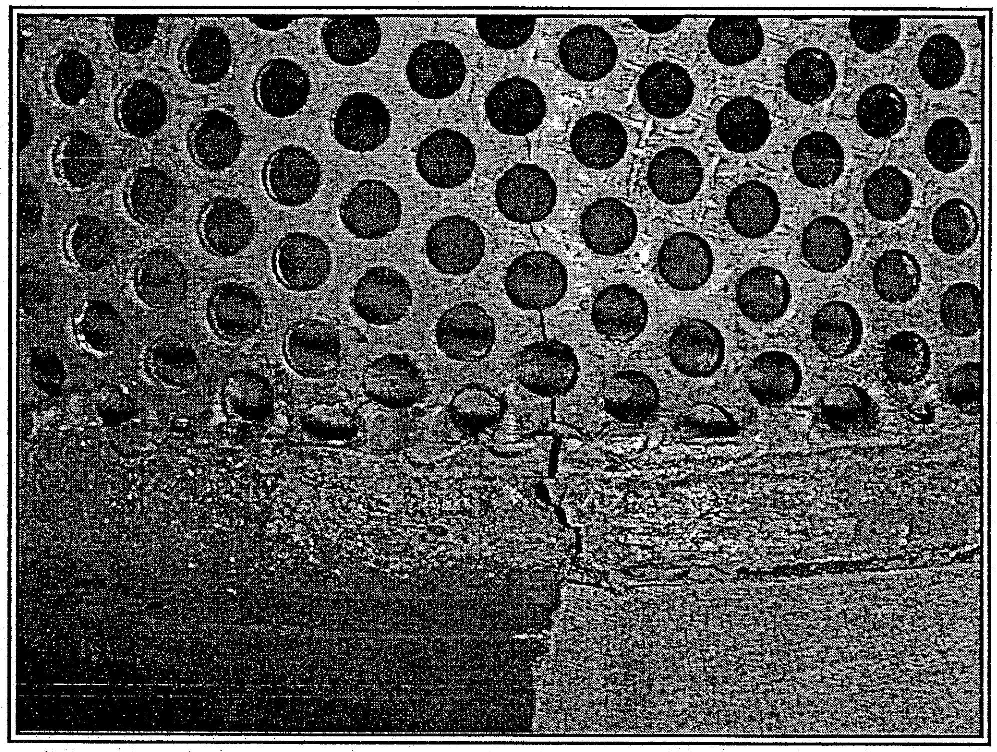


Figure 16: Photograph of the flange cracks in the witch's hat strainer

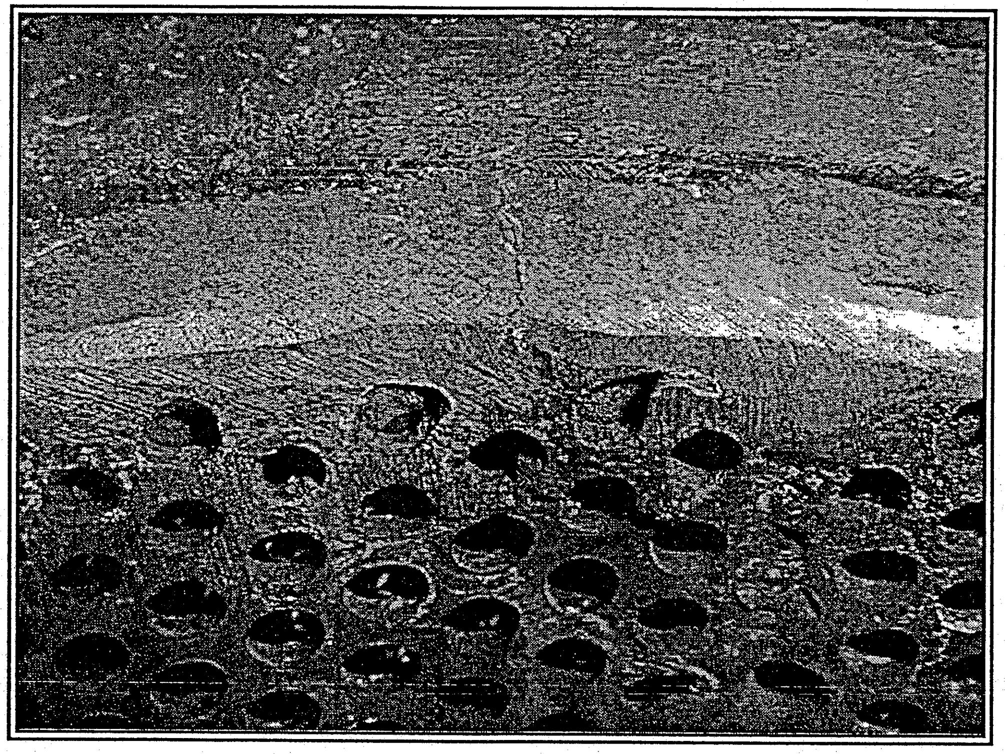


Figure 17: Photograph of the flange cracks in the witch's hat strainer

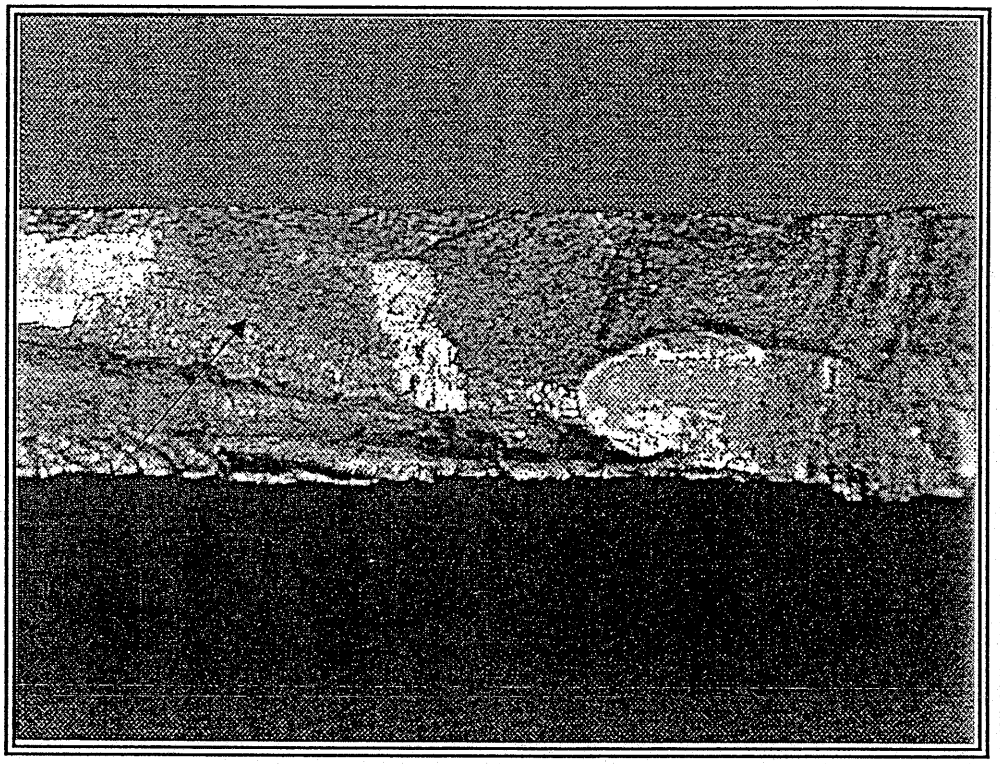
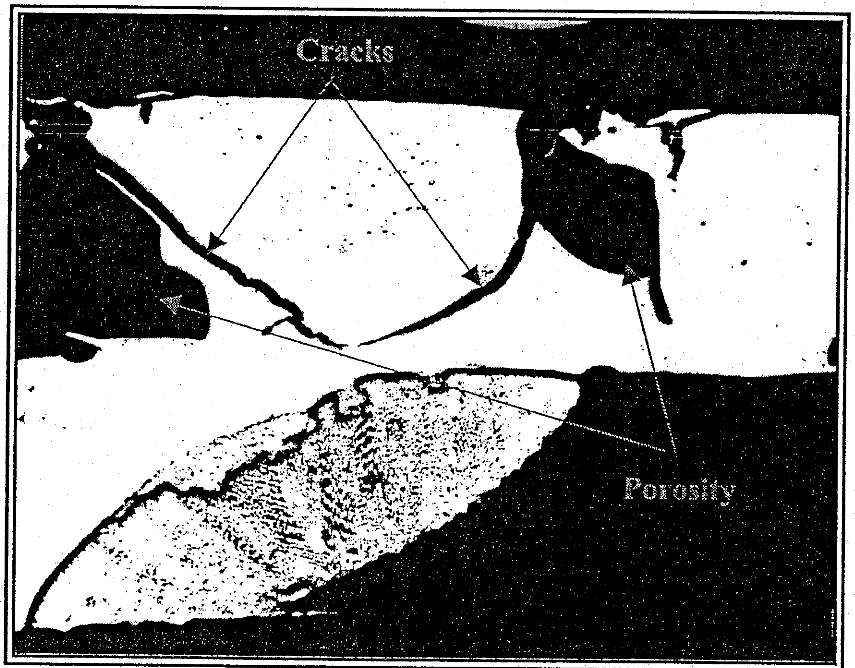
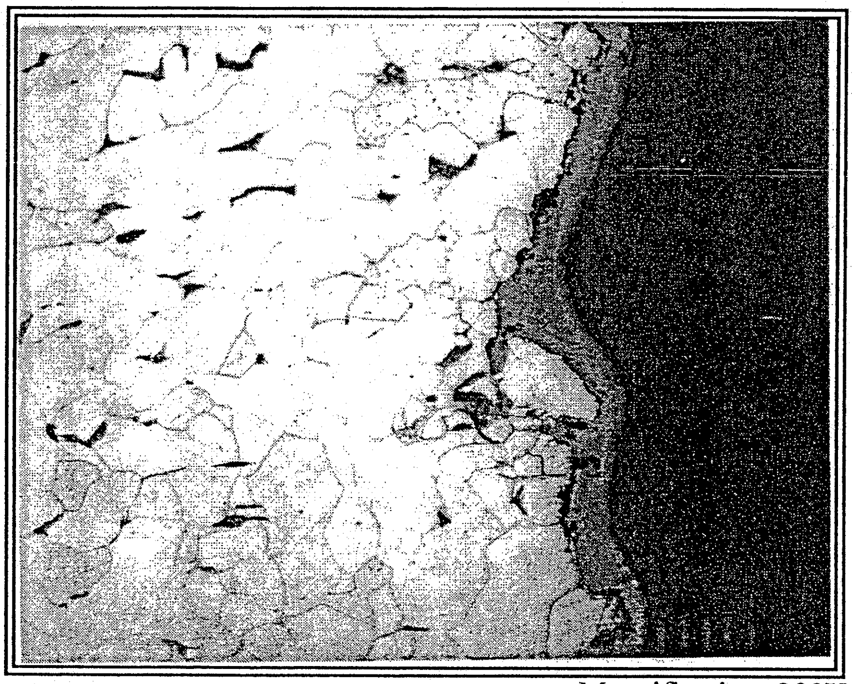


Figure 18: Photograph of the crack arrest lines on the fracture surface of the witch's hat flange section (arrow)



Magnification: 25X

Figure 19: Photograph of the flange cracks in the witch's hat strainer

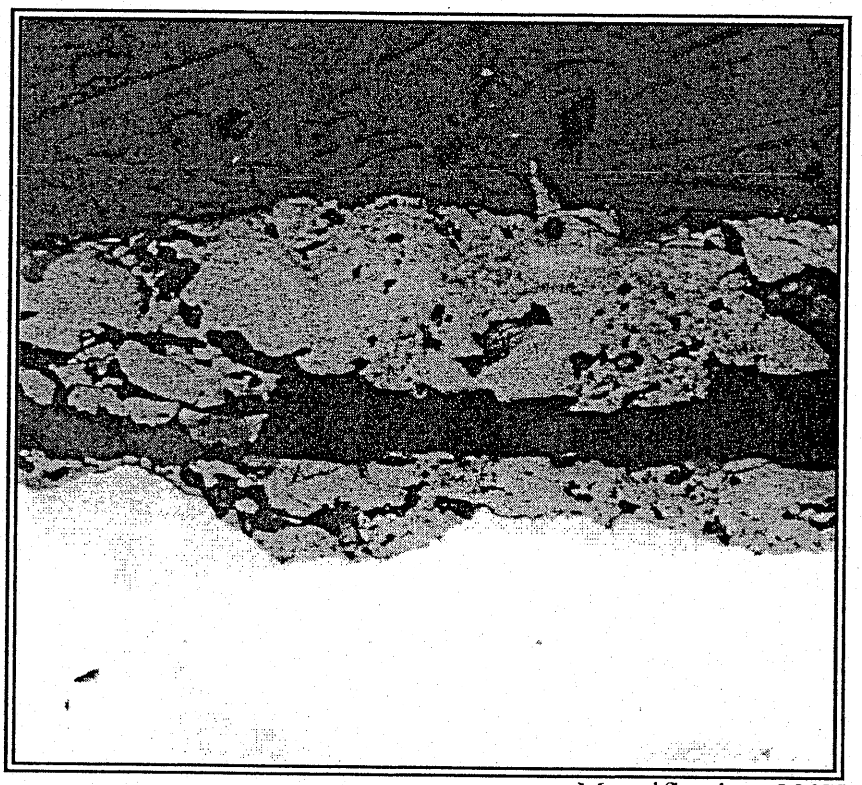


Magnification: 200X

Figure 20: Photomicrograph of the conduit tube fracture surface with a light scale formation

Magnification: 100X

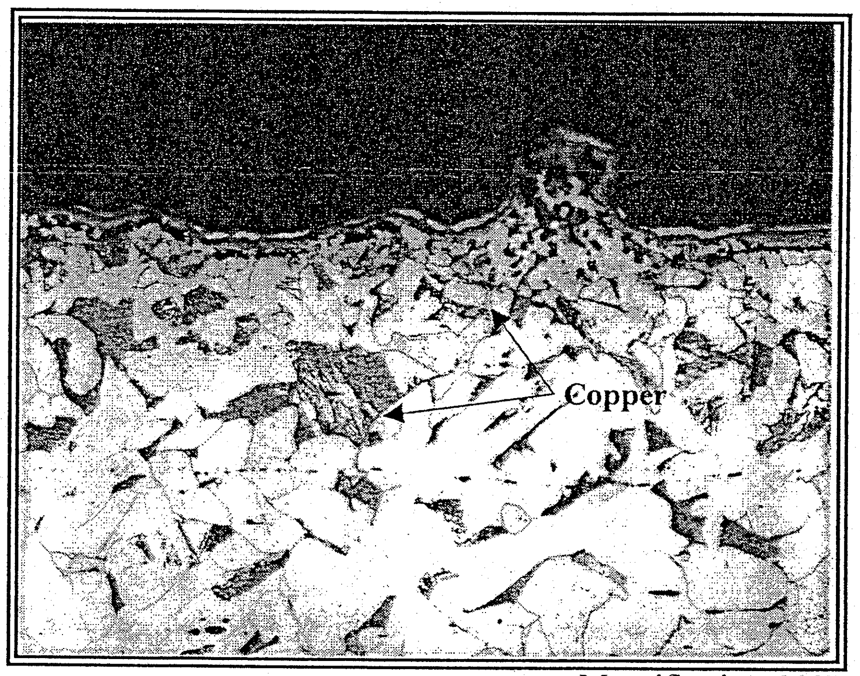
Figure 20: Photomicrograph of the inner surface of the conduit tube showing a heavy scale and copper layer.



Magnification: 200X

Figure 22: Photomicrograph of the outer surface of the conduit tube with a heavy scale formation

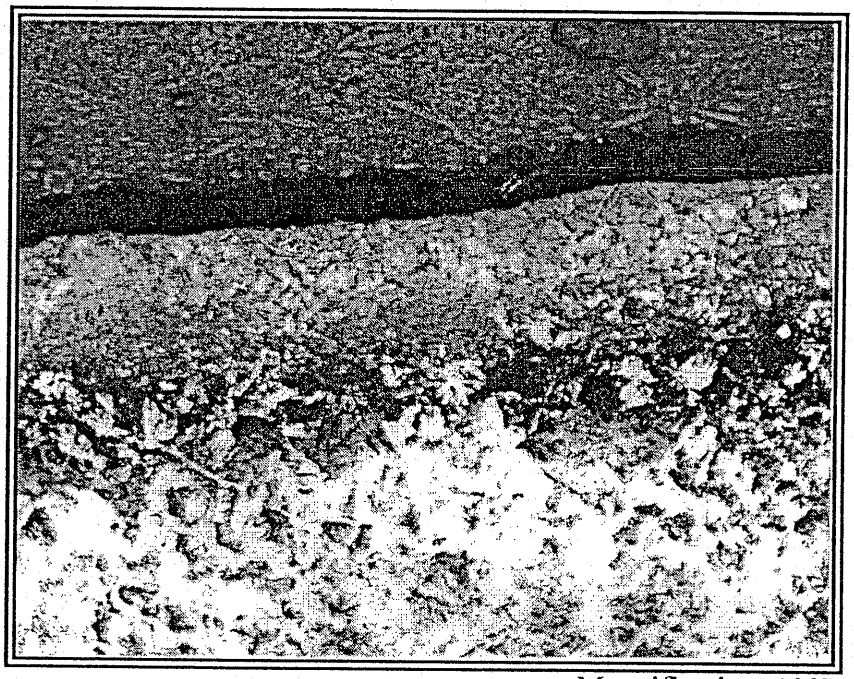
1190 Atlanta Industrial Drive, Marietta, Georgia 30066 • (770) 423-1400 Fax (770) 424-6415



Magnification: 200X

Figure 23: Photomicrograph of the conduit tube surface with a light scale formation and evidence of LME (arrow)

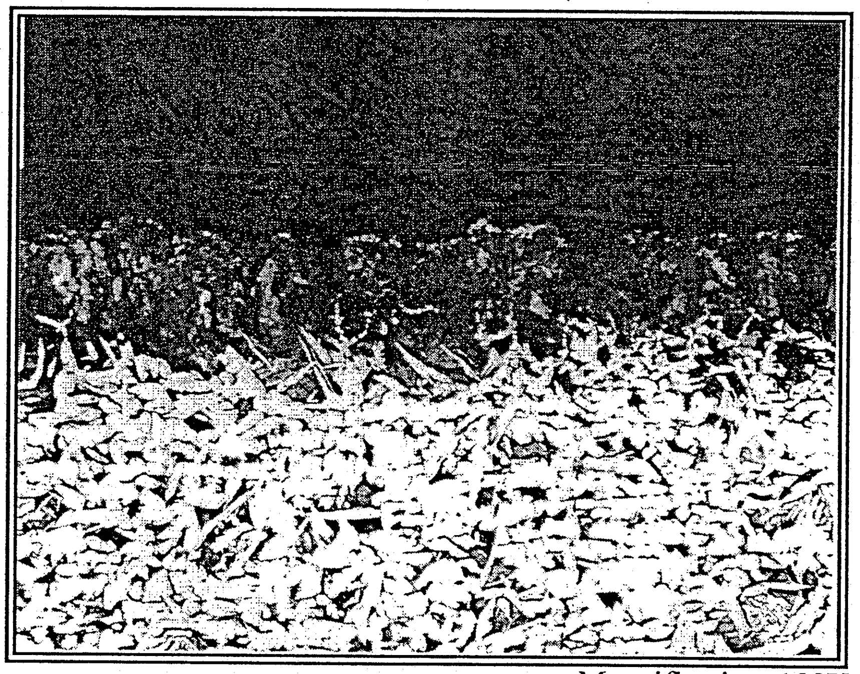
The copper infiltrated the steel along the grain boundaries and made the steel susceptible to intergranular cracking.



Magnification: 100X

Figure 24: Photomicrograph of the inner surface of the pipe section in the region of the rupture

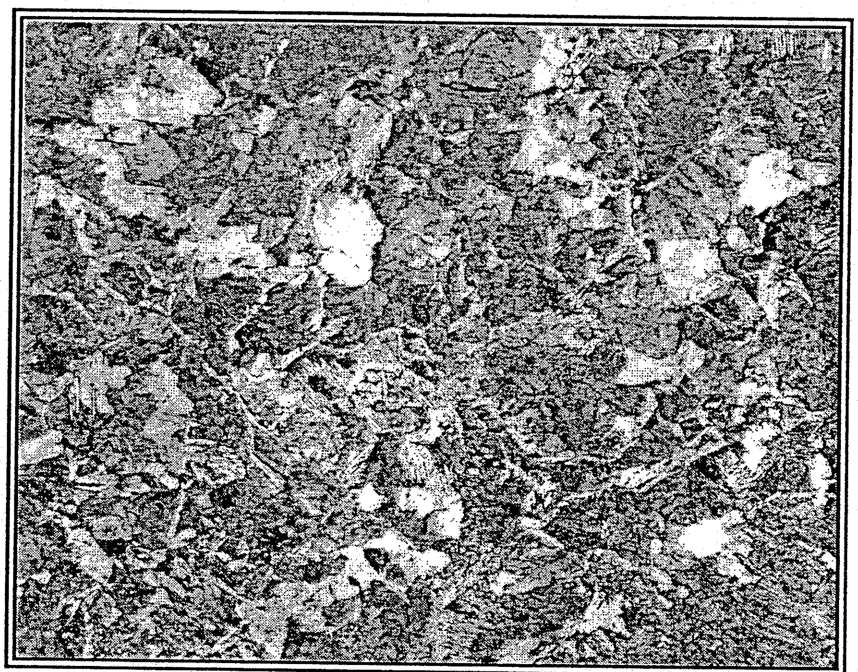
The inner surface of the pipe section was carburized.



Magnification: 100X

Figure 25: Photomicrograph of the inner surface of the pipe section in the region away the rupture

The inner surface of the pipe was carburized.



Magnification: 100X

Figure 26: Photomicrograph of the pipe section in the region of the rupture

The microstructure consisted of large pearlite colonies with some proeutectoid ferrite at the prior austenitic grain boundaries.

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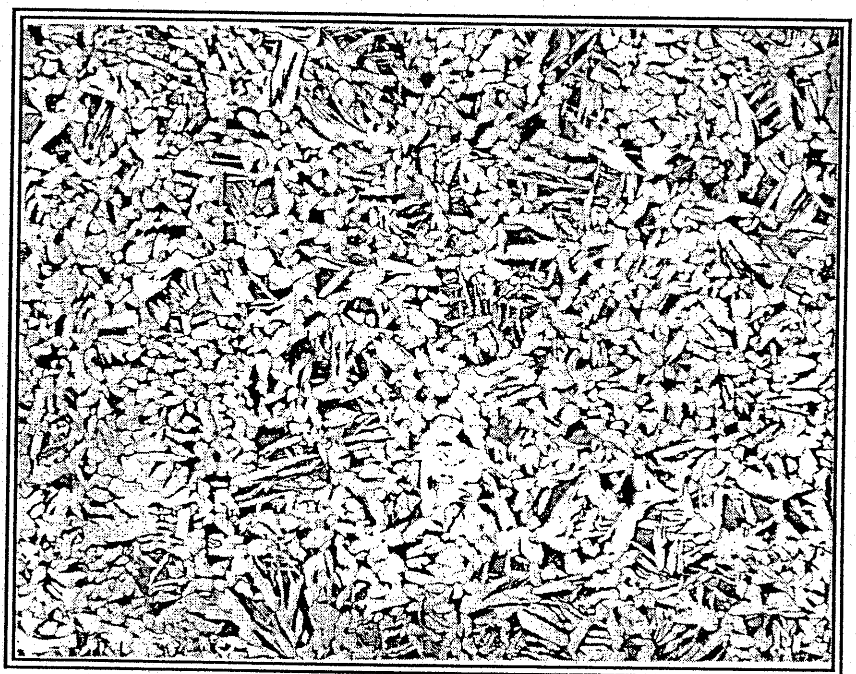

Magnification: 100X

Figure 27: Photomicrograph of the pipe section in the region away the rupture

The microstructure consisted of a mixture of ferrite and pearlite.

APPENDIX I

TRA DATA REQUEST AND CHATTANOOGA GAS RESPONSE

TENNESSEE REGULATORY AUTHORITY

460 James Robertson Parkway
Nashville, Tennessee 37243-0505

April 5, 2001

Mr. Larry Buie, General Manager
Chattanooga Gas Company
6125 Preservation Drive
Chattanooga, TN 37416-3652

VIA FACSIMILE: 423-490-4333

Dear Mr. Buie:

On October 23, 2000, a leak and fire occurred on the Liquefied Natural Gas (LNG) facility owned and operated by Chattanooga Gas Company (CGC) located at 3401 North Hawthorne Street, Chattanooga, Tennessee. The leak and fire resulted in an emergency shutdown of the facility and notification of the incident to local emergency personnel and the Tennessee Regulatory Authority.

The TRA Gas Pipeline Safety Division, in an effort to conduct a thorough investigation, requests that you provide the following data by noon April 16, 2001.

1. All records demonstrating the times and dates when the UV and combustible gas detectors were placed on or in a bypass mode in the time period of September 1 through October 23, 2000. (This information should be filed for each day and hour through October 23, 2000.)

2. All records demonstrating the times and dates when the LNG plant was in liquefaction or vaporization modes in the time period of September 1 through October 23, 2000.

3. All daily log records of activities including maintenance, repair and other operations at the plant in the time period of September 1 through October 23, 2000.

4. Documents pertaining to all liaison meetings that were conducted or attended by CGC with local police, fire officials and emergency personnel to discuss emergency response responsibilities from October 1, 1999 to October 31, 2000. Information should contain names of individuals, organizations that attended the meetings, and items discussed.

5. All documentation and photographs pertaining to the repairs, maintenance and use of the pretreatment dehydrator and its components (involved in the leak and fire in question) for the twelve (12) month period preceding October 23, 2000. Please include any manufacturer manuals, warranties, specifications, instructions, etc.

Your response should be directed to me. If you have any questions regarding this request for information, please contact Glynn Blanton, Chief Gas Pipeline Safety Division, at 1-800-342-8359, Ext. 185.

Sincerely,

K. David Waddell

K. David Waddell
Executive Secretary

c: Glynn Blanton

Telephone (615) 741-2904, Toll-Free 1-800-342-8359, Facsimile (615) 741-5015
www.state.tn.us/tra

Chattanooga Gas Company

6125 Preservation Drive
Chattanooga, TN 37416
Telephone (423) 490-4302

April 12, 2001

Mr. K. David Waddell
Executive Secretary
Tennessee Regulatory Authority
460 James Robertson Parkway
Nashville, Tennessee 37243-0505

Dear Mr. Waddell:

Enclosed is information requested in your letter dated April 5, 2001, regarding the incident at our Chattanooga LNG facility on October 23, 2000. In accordance with your letter, the following information is being provided:

1. All records demonstrating the times and dates when the UV and combustible gas detectors were placed on or in a bypass mode in the time period of September 1 through October 23, 2000.

Please see Attachment A for a copy of the operating logbook for 9/1 through 10/23/00. While the plant is in a liquefaction mode the automatic shutdown mechanisms of the UV detection system is bypassed, however a visual and audible alarm would still be operational. These instances are recorded in the logbook, but the combustible gas detection system is never placed on bypass.

2. All records demonstrating the times and dates when the LNG plant was in liquefaction or vaporization modes in the time period of September 1 through October 23, 2000.

Please see Attachment B for a copy of the monthly liquefaction and vaporization report for September and October 2000.

3. All daily log records of activities including maintenance, repair, and other operations at the plant in the time period of September 1 through October 23, 2000.

Please see Attachment A for this information. Attachment C is provided as a record of maintenance performed from October 23, 1999 to October 23, 2000. Also included as Attachment D are copies of the charts and outside log readings on the night of the ignition.

4. Documents pertaining to all liaison meetings that were conducted or attended by Chattanooga Gas Company with local police, fire officials, and emergency personnel to discuss emergency response responsibilities from October 1, 1999 to October 23, 2000.

Between the dates requested, Chattanooga LNG plant personnel held a meeting on June 20, 2000 with emergency and fire officials. Included as Attachment E is the fire department inspection report from that meeting. Since the October 23, 2000 incident, LNG plant personnel have had numerous meetings with these officials.

5. All documentation and photographs pertaining to the repairs, maintenance, and use of the pretreatment dehydrator and its components (involved in the leak and fire in questions) for the 12 month period preceding October 23, 2000.

Please see Attachment C for a list of maintenance performed in the 12 month period preceding the fire. Attachment F provides the flow chart for the dehydrators, and Attachment G provides the orbit valve sequence for the dehydrators. Based on conversations between Gary Northrup of our company and Glynn Blanton, it is our understanding that the manufacturers' manuals, warranties, and instructions are no longer required. If this is not the case, please let us know, and we will send those to you as quickly as possible.

Additional information is also being provided that should aid in the completion of your investigation. Attachment H is a copy of the process design and description for the LNG plant. Attachment I provides a list of the emergency shutdown buttons, and Attachment J provides a list of valves closed in an emergency. Finally, the Chattanooga LNG Plant Safety and Emergency Manual is included as Attachment K.

If you or any of your staff should have any questions or need additional information, please contact me at 404-584-3552.

Sincerely,

Richard R. Lonn
Chief Engineer and Director
Regulatory Compliance

Attachments

cc w/ attachments: Mr. Glynn Blanton
Chief, Gas Pipeline Safety Division
Tennessee Regulatory Authority

bc w/o attachments: Ms. P. Rosput
Mr. R. Duszynski
Mr. C. Preble
Mr. I. Blythers
Mr. J. Scabareti
Ms. S. Sitherwood
Mr. L. Buie
Ms. E. Goldsack
Ms. L. Lamberth
Mr. S. Lindsey
Mr. G. Northrup
Mr. R. Rogers
Mr. P. Wagner
Mr. K. Wolff

Attachment A:

Operating Log Book

9/1/00 – 10/23/00

2300 0700 PARRIS / Jernigan

0023 Adding Methane, Due to fluctuation of temps, 3 mins.

0100 Took rding / Turbine

0140 Adding $2^{\#}$ N2

0200 Took rding / Bo

0220 Stopped N2

0230 Decreased turbine, trying to compensate for Hi oil temp. Not in Alarm yet (167).

0330 - NORMAN out.

0615 S/D, Low Hydraulic Trip Circuit B. Closing Regen Valve, local,

Note: Gas Control Called at 0630 requesting status for Weekend Please Call "Brad" with info

9-1-00 0700-1500 McCain

0757 Started Turbine Did not Fire

0812 Rolled Turbine "Shut due to oil leak."

0945 Started Turbine

1110 Cut Back on H.P. speed 7000 to 6900.

1200 Added 5 C_2

1238 Bob Furcron in.

1300 Added 1 Propane

1400 C.G.C in to Check meters.

1500-2300- Friday 09/01/00 Camp

1800- Checked Readings, Plant & Area. Added 1 Propane.

2000- Added 1 Iso Butane

2200- Checked Machine, Equipment & Readings

2300 - 0700 PARRIS 9-2

Status - Running

2315 Norman + Dean Out

2320 TERRY ROSS called gave me additional info of B/D of oilcooler system.

2345 LK'd Equipment

0205 Taking Equip Rding

0530 TAKing Equip Rding

Note: 0555 Water is off at cooling tower

Note: 0640 Water is ON at cooling tower

9-2-00 0700 - 1500 Ross

Added 5 gal recovered and 5 gal new oil to B.O. comp. Checked P108 oil Checked York oil level.

Fuel gas up to 4.5 from 4.0 - 245°

1215 Bobbie DERKel

1240 " " out

1500-2300 Saturday 9/2/00 Cain

1430 - Added 10 gals of new oil to Boiloff Compressor.

1445 - Blew down Turbine Oil Cooler

1530 - Readings, Checked Area.

1800 - Turned on Water to cooling tower

2000 - Turned Water OFF

Took readings, Checked Plant & Machinery

1900 - NJ IN.

2300 - 0700 PARRIS / Jernigan

2240 Notified CLNG of status for CHLNG

0045 Notified CLNG of status for CHLNG

Note: L/C cannot help remedy the tailgas dilemma.

0200 - Taking equip Rding

0300 - NORMAN OUT.

0240 Notified CLNG of status for CHLNG

0450 Notified CLNG of status for CHLNG

0530 Taking equip Rding

0635 Notified CLNG of status for CHLNG

9-3-00 0700-1500 Pross

Checked oil P108 O.K.

Check riss and plant checks O.K

1500-2300 Sunday 9/3/00 Ciaw

1600 - All is running Well. LNG is 5.3 roots. All temps are good.

1800 - Norm in

1900 - Took readings, Checked Plant and added 5 bottles of Ethylene. Blew down Oil Cooler on Turbine, Balanced Water Flow ontop of CT

2300-0700 Parrib / Jernigan

2305 Ck'd in with CLNG.

0000 Ck'd equip.

0130 Ck'd in with CLNG

0200 Taking Equip Rding

0300 NJ out.

318 Feed Gas to Liq Hi CO_2 (spiked to 9.8)

Lowered Feed Gas (marginly)

FI-12 off scale

0545 Taking Equip Rding

9-4-00 0700-1500 Ross

1030 Cleaned turbine blades with walnut hulls

1120 Cleaned blades again

1500-2300 Monday 9/4/00 Cain

1500- Cleaned Turbine blade.

Liquefaction Mode @ 4.3 roots

All temps and pressures are good.

Increased Water Supply @ Cooling Tower

1830 - Checked Readings & Area.

1900 - Checked CT flow - balanced

Tossed Walnut Shells into Turbine Intake

Blew down Turbine Oil Cooler.

2200 - Checked Plant, all OK

2300- 0700 PARRIS / Jernigan

2304 CK'd in with the CLNG

0000 CK'd equip

0108 CK'd in with CLNG

0200 Taking Equip Rding

Adding 5 bottles of ethylene

0300 CK'd in with CLNG

0500 CKd in with CLNG

Note 0540 Painters on site

Regen gas has come up to 7.4, allowing tailgas to leave Plant

Added 1" meth, 1" N_2

9-5-00 0700-1500 Prue

Lizzy in Rogers in

0815 P+T delivery

0830 Rogers in

Please Start USING E-Log ON Computer

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OPERATING LOGBOOK

Plant	Chattanooga LNG
LogBooks	<All>

Printed on:	06-Apr-2001 11:57:24 PM
Printed by:	tposs

LogID	Priority	Date	Time	User	Description
320	Low	09-Sep-2000	7:16:48 AM	jparris	Ck'd with CLNG, @ 72 gpm
310	Low	08-Sep-2000	2:12:45 PM	tposs	Liquefaction @ 85 GPM.
765	Low	06-Sep-2000	6:32:33 AM	jparris	0600 : Took equipment rdings- OK, 78 gpm
761	Low	06-Sep-2000	5:00:17 AM	jparris	0500 : Ck'd in with CLNG @ 78 gpm
760	Low	06-Sep-2000	4:00:49 AM	jparris	0400 : Ck'd equipment status- OK
759	Low	06-Sep-2000	3:09:09 AM	jparris	0300 : Ck'd in with CLNG, 78 gpm
758	Low	06-Sep-2000	2:37:36 AM	jparris	0200 : Took rding- OK , 78 gpm
756	Low	06-Sep-2000	1:07:35 AM	jparris	0100 : Ck'd in with CLNG @ 78 gpm
755	Low	06-Sep-2000	12:41:58 AM	njerniga	1240 CHECKING E-LOG
752	Low	05-Sep-2000	3:37:35 PM	rmccain	Liquefaction
751	Low	05-Sep-2000	3:22:10 PM	tposs	Liquefaction
748	Low	05-Sep-2000	11:47:14 AM	tposs	Liquefaction
747	Low	05-Sep-2000	11:37:08 AM	tposs	Liquefaction
746	Low	05-Sep-2000	10:09:55 AM	tposs	Liquefaction
735	Low	05-Sep-2000	4:19:47 AM	jparris	Ck'd equipment

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OPERATING LOGBOOK

Plant	Chattanooga LNG
LogBooks	<All>

Printed on:	06-Apr-2001 11:57:24 PM
Printed by:	tposs

LogID	Priority	Date	Time	User	Description
782	Low	06-Sep-2000	10:37:36 PM	rmccain	Liquefaction
781	Low	06-Sep-2000	4:19:14 PM	rmccain	Liquefaction
778	Low	06-Sep-2000	2:29:22 PM	tposs	Liquefaction
772	Low	06-Sep-2000	11:14:49 AM	tposs	Liquefaction
767	Low	06-Sep-2000	7:31:23 AM	tposs	Liquefaction
1139	Low	01-Oct-2000	7:17:40 AM	jparris	No problems with system
1135	Low	30-Sep-2000	11:57:58 PM	jparris	Ck'd in with CLNG, Liquefaction running
1113	Low	28-Sep-2000	7:04:59 AM	jparris	Security
1080	Low	26-Sep-2000	3:01:50 AM	tposs	Liquefaction @ 78gpm.
1074	Low	25-Sep-2000	10:43:46 PM	jparris	Liquefaction running
1061	Low	25-Sep-2000	3:20:27 PM	jparris	Ck'd in with RLNG, Liquefaction running
1045	Low	24-Sep-2000	3:24:09 PM	jparris	Ck'd with CLNG, Running @ reduced rate
1037	Low	24-Sep-2000	3:24:00 AM	tposs	Liquefaction. Regen outlet 203psi.
1033	Low	23-Sep-2000	3:11:15 PM	jparris	Ck'd in with CLNG , Liquefaction running
1032	Low	23-Sep-2000	2:47:34 PM	rmccain	Liquefaction @ 59 gpm
1112	Low	28-Sep-2000	6:51:12 AM	jparris	Security
989	Low	19-Sep-2000	10:22:50 PM	jparris	Took water sample #6 , PH @ 8.41
984	Low	19-Sep-2000	8:17:17 PM	jparris	2000 : Took water Sample #5, PH @ 8.44
981	Low	19-Sep-2000	6:29:53 PM	jparris	1800 : Took water sample #4, PH @ 8.43
1111	Low	28-Sep-2000	6:28:46 AM	jparris	Security
1110	Low	28-Sep-2000	5:53:26 AM	jparris	Security
1021	Low	22-Sep-2000	6:27:37 AM	tposs	0600 Water sample for PH. plant @ 65gpm.
935	Low	16-Sep-2000	5:33:25 PM	tposs	Liquefaction @ 83gpm.co2 OK.
926	Low	15-Sep-2000	9:08:28 PM	tposs	Liquefaction @ 91gpm. Beds are in good shape@17ppm
1100	Low	27-Sep-2000	6:57:30 AM	tposs	Security
1085	Low	26-Sep-2000	6:49:15 AM	tposs	Security
1006	Low	21-Sep-2000	6:57:33 AM	dcain	Security Log
948	Low	18-Sep-2000	6:21:55 AM	rmccain	Security
902	Low	14-Sep-2000	3:59:40 PM	tposs	GE. turbine fuel regulator
899	Low	14-Sep-2000	2:44:08 PM	jparris	Status : Liquefaction is running
894	Low	14-Sep-2000	11:19:53 AM	jparris	Ck'd in with CLNG, Status-Running liquid
892	Low	14-Sep-2000	8:39:29 AM	jparris	0800 : Added water to turbine shell
866	Low	12-Sep-2000	10:14:34 PM	tposs	Liquefaction rate @ 78 gpm.
865	Low	12-Sep-2000	8:11:33 PM	tposs	Liquefaction @72gpm. CO2.OK.
859	Low	12-Sep-2000	1:31:22 PM	jparris	1325 : Start Liquefaction pump
858	Low	12-Sep-2000	12:50:24 PM	jparris	1215 Start turbine
829	Low	09-Sep-2000	4:04:44 PM	rmccain	1602 : Notified G/C of pending start-up.

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OPERATING LOGBOOK

Plant	Chattanooga LNG
LogBooks	<All>

Printed on:	06-Apr-2001 11:57:24 PM
Printed by:	tposs

LogID	Priority	Date	Time	User	Description
69	Low	19-Sep-2000	7:26:38 AM	dcain	Liquefaction Mode
68	Low	19-Sep-2000	5:58:19 AM	rmccain	Security
66	Low	19-Sep-2000	4:36:55 AM	rmccain	Liquefaction
65	Low	19-Sep-2000	1:04:44 AM	rmccain	Liquefaction
61	Low	18-Sep-2000	5:06:06 PM	tposs	Liquefaction
58	Low	18-Sep-2000	2:07:46 PM	dcain	Liquefaction Mode
57	Low	18-Sep-2000	11:32:16 AM	dcain	Liquefaction Mode
52	Low	18-Sep-2000	8:15:54 AM	dcain	Liquefaction Mode
47	Low	18-Sep-2000	2:26:04 AM	rmccain	Liquefaction
42	Low	11-Sep-2000	5:37:24 AM	dcain	Liquefaction Mode
40	Low	10-Sep-2000	7:22:07 PM	rmccain	Liquefaction
33	Low	10-Sep-2000	7:41:46 AM	jparris	0735 : Ck'd in with CLNG
31	Low	09-Sep-2000	9:55:36 PM	rmccain	Liquefaction
30	Low	09-Sep-2000	6:03:30 PM	rmccain	1802 : Turbine running
28	Low	09-Sep-2000	3:57:31 PM	rmccain	Liquefaction:
25	High	09-Sep-2000	2:01:01 PM	jparris	Turbine
23	Low	09-Sep-2000	10:54:34 AM	jparris	1045 : Notified G/C of inventory
21	High	09-Sep-2000	10:09:32 AM	jparris	Liquefaction Shutdown
19	Low	09-Sep-2000	5:59:51 AM	dcain	Liquefaction Mode
16	Low	08-Sep-2000	9:08:58 PM	rmccain	Liquefaction
15	Low	08-Sep-2000	6:59:28 PM	rmccain	Liquefaction
13	Low	08-Sep-2000	2:55:23 PM	dhefner	Started C-201 and C-202
12	Low	08-Sep-2000	2:54:16 PM	dhefner	Plant walk through.
11	Low	08-Sep-2000	2:53:21 PM	dhefner	Stopped C-201 and c-202
06	Low	08-Sep-2000	11:57:30 AM	dhefner	Started boiloff com. C-201 and C-202.
05	Low	08-Sep-2000	11:55:42 AM	dhefner	Hour readings , S& J reading , and meter readings
04	Low	08-Sep-2000	11:53:34 AM	dhefner	Readings
03	Low	08-Sep-2000	11:51:08 AM	dhefner	Stopped boiloff com. C-201 and C-202
02	Low	08-Sep-2000	11:46:12 AM	dhefner	Radio Check
01	Low	08-Sep-2000	10:15:40 AM	tposs	Liquefaction @ 86 GPM.
99	Low	08-Sep-2000	5:57:45 AM	dcain	Liquefaction Mode
94	Low	07-Sep-2000	10:09:15 PM	rmccain	Liquefaction
93	Low	07-Sep-2000	8:53:56 PM	rmccain	Liquefaction
92	Low	07-Sep-2000	5:42:19 PM	rmccain	Liquefaction
90	Low	07-Sep-2000	1:44:30 PM	tposs	Liquefaction
89	Low	07-Sep-2000	8:30:56 AM	tposs	Liquefaction
85	Low	07-Sep-2000	5:56:33 AM	dcain	Liquefaction Mode

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OPERATING LOGBOOK

Plant	Chattanooga LNG
LogBooks	<All>

Printed on:	06-Apr-2001 11:57:24 PM
Printed by:	tposs

.ogID	Priority	Date	Time	User	Description
087	Low	26-Sep-2000	6:54:37 AM	tposs	Liquefaction
075	Low	25-Sep-2000	11:46:47 PM	tposs	Liquefaction
060	Low	25-Sep-2000	2:54:06 PM	njerniga	liquefaction
059	Low	25-Sep-2000	11:44:48 AM	njerniga	water treatment, tank level, gals.
052	Low	25-Sep-2000	12:34:49 AM	tposs	Liquefaction @ 45 gpm.
044	Low	24-Sep-2000	2:56:42 PM	rmccain	liquefaction @ 39 gpm
041	Low	24-Sep-2000	10:23:31 AM	rmccain	Morning Report Liquid unit @39 gpm
040	Low	24-Sep-2000	8:12:18 AM	rmccain	Liquefaction @ 39 gpm.
038	Low	24-Sep-2000	6:07:41 AM	tposs	Liquefaction
031	Low	23-Sep-2000	10:07:28 AM	rmccain	Morning Report
030	Low	23-Sep-2000	7:03:24 AM	tposs	Liquefaction
027	Low	23-Sep-2000	12:42:45 AM	tposs	Liquefaction
024	Low	22-Sep-2000	3:19:49 PM	jparris	Added chemicals to water tower
023	Low	22-Sep-2000	10:52:58 AM	dcain	Morning Report
022	Low	22-Sep-2000	7:22:53 AM	dcain	Liquefaction Mode
020	Low	22-Sep-2000	4:22:13 AM	tposs	Liquefaction
019	Low	22-Sep-2000	12:01:22 AM	tposs	liquefaction
018	Low	21-Sep-2000	10:18:20 PM	jparris	Water sample
017	Low	21-Sep-2000	8:50:21 PM	jparris	Water sample
015	Low	21-Sep-2000	6:30:28 PM	jparris	Water sample
012	Low	21-Sep-2000	4:05:57 PM	jparris	Water Sample
009	Low	21-Sep-2000	9:56:43 AM	dcain	Morning Report
008	Low	21-Sep-2000	9:00:49 AM	dcain	Oil and Water leak
007	Low	21-Sep-2000	7:09:11 AM	dcain	Stand By Mode
98	Low	20-Sep-2000	4:58:30 PM	jparris	1645 : WATER
97	Low	20-Sep-2000	3:44:21 PM	jparris	Pending Shutdown
96	Low	20-Sep-2000	1:13:44 PM	dcain	Liquefaction Mode
95	Low	20-Sep-2000	10:26:02 AM	dcain	Morning Report
94	Low	20-Sep-2000	8:18:12 AM	dcain	Liquefaction Mode
93	Low	20-Sep-2000	6:01:19 AM	rmccain	security
92	Low	20-Sep-2000	1:52:53 AM	rmccain	Liquefaction @ 58gpm
83	Low	19-Sep-2000	7:17:28 PM	jparris	1915 : Added 55 gals. of oil
80	Low	19-Sep-2000	4:12:13 PM	jparris	1555 : Ck'd in with CLNG , Status: liquefaction
73	Low	19-Sep-2000	2:03:07 PM	dcain	Oil Leak on Turbine
72	Low	19-Sep-2000	11:12:08 AM	dcain	Oil Sumps Drained/ Water Sample Taken
71	Low	19-Sep-2000	9:45:01 AM	dcain	Liquefaction Mode
70	Low	19-Sep-2000	8:41:28 AM	dcain	Plant Walk Thru

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OPERATING LOGBOOK

Plant	Chattanooga LNG
LogBooks	<All>

Printed on:	06-Apr-2001 11:57:24 PM
Printed by:	tposs

LogID	Priority	Date	Time	User	Description
1423	Low	15-Nov-2000	6:36:01 AM	rmccain	Security
1407	Low	13-Nov-2000	6:20:27 AM	rmccain	Security
1207	Low	11-Oct-2000	2:29:57 PM	njerniga	visitors
1206	Low	11-Oct-2000	3:35:30 AM	jparris	0320 : Boiloff S/D
1203	Low	10-Oct-2000	9:23:16 PM	tposs	Liquefaction
1201	Low	10-Oct-2000	4:26:01 PM	tposs	Liquefaction
1200	Low	10-Oct-2000	1:02:10 PM	njerniga	liquefaction
1198	Low	09-Oct-2000	5:39:42 PM	rmccain	Liquefaction
1196	Low	09-Oct-2000	8:41:25 AM	njerniga	liquefaction
192	Low	08-Oct-2000	6:38:01 PM	rmccain	Liquefaction
187	Low	07-Oct-2000	6:53:13 PM	rmccain	Liqufaction
181	Low	06-Oct-2000	10:19:11 PM	rmccain	Liquefaction
179	Low	06-Oct-2000	12:44:23 PM	njerniga	liquefaction
176	Low	05-Oct-2000	10:16:52 PM	rmccain	Liquefaction @ 65 gpm
175	Low	05-Oct-2000	4:01:31 PM	rmccain	Liquefaction
174	Low	05-Oct-2000	10:35:35 AM	njerniga	liquefaction
173	Low	04-Oct-2000	9:16:45 PM	rmccain	Liquefaction Down
165	Low	04-Oct-2000	8:33:36 AM	njerniga	liquefaction
162	Low	03-Oct-2000	9:27:26 PM	rmccain	Liquefaction
160	Low	03-Oct-2000	1:51:06 PM	njerniga	liquefaction
159	Low	03-Oct-2000	8:11:40 AM	jparris	0800 : Attempting re -start of turbine
156	Low	02-Oct-2000	11:53:24 PM	jparris	Shutdown
155	Medium	02-Oct-2000	11:41:35 PM	jparris	Shut Down
129	Low	30-Sep-2000	10:56:30 AM	dcain	Liquefaction Mode/Morning Report
128	Low	30-Sep-2000	6:48:36 AM	jparris	Ck'd with CLNG , Liquefaction running
125	Low	29-Sep-2000	10:41:46 PM	dcain	Liquefaction Mode
122	Low	29-Sep-2000	12:47:58 PM	njerniga	liquefaction
120	Low	29-Sep-2000	6:23:12 AM	jparris	Ck'd in with CLNG @ 2330
115	Low	28-Sep-2000	5:06:34 PM	dcain	Liquefaction Mode
114	Low	28-Sep-2000	10:21:21 AM	rmccain	Liquefaction @72 gpm
107	Low	27-Sep-2000	11:47:30 PM	jparris	Ck'd in with CLNG
104	Low	27-Sep-2000	2:52:35 PM	njerniga	cooling tower
098	Low	27-Sep-2000	2:06:41 AM	tposs	Liquefaction
094	Low	26-Sep-2000	10:40:06 PM	dcain	End of SHift
093	Low	26-Sep-2000	3:38:33 PM	dcain	Liquefaction Mode 1500-2300 Shift
091	Low	26-Sep-2000	2:37:47 PM	njerniga	REFRIGERANT
088	Low	26-Sep-2000	10:17:54 AM	rmccain	Morning Report

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OPERATING LOGBOOK

Plant	Chattanooga LNG
LogBooks	<All>

Printed on:	06-Apr-2001 11:57:24 PM
Printed by:	tposs

LogID	Priority	Date	Time	User	Description
269	Low	21-Oct-2000	7:34:24 AM	rmccain	Security
258	Low	19-Oct-2000	6:56:45 AM	tposs	Securty
232	Low	16-Oct-2000	3:50:19 PM	tposs	Securty
204	Low	11-Oct-2000	12:37:35 AM	mmcphers	Plant Security System
171	Low	04-Oct-2000	2:57:32 PM	njerniga	turbine
170	Low	04-Oct-2000	1:42:43 PM	njerniga	turbine
103	Low	27-Sep-2000	2:49:27 PM	njerniga	liquefaction
092	Low	26-Sep-2000	2:44:26 PM	njerniga	CARBONBLAST
011	Low	21-Sep-2000	2:32:35 PM	dcain	Liquefaction Start Up in Progress
44	Low	17-Sep-2000	5:49:09 PM	tposs	Liquefaction @ 80gpm. co2. OK.
42	Low	17-Sep-2000	2:23:20 PM	dcain	Liquefaction Mode
40	Low	17-Sep-2000	3:52:36 AM	rmccain	Liquefaction
38	Low	17-Sep-2000	1:39:20 AM	rmccain	LIQUEFACTION
37	Low	17-Sep-2000	12:49:41 AM	rmccain	Liquefaction
32	Low	16-Sep-2000	5:52:56 AM	rmccain	Liqufaction
31	Low	16-Sep-2000	12:17:42 AM	rmccain	Liquefaction
25	Low	15-Sep-2000	8:02:19 PM	tposs	Liquefaction 2000hr @ 80gpm
24	Low	15-Sep-2000	5:29:59 PM	tposs	Liquefaction
22	Low	15-Sep-2000	12:10:10 PM	dcain	Liquefaction Mode
17	Low	15-Sep-2000	10:38:27 AM	dcain	Morning Readings
15	Low	15-Sep-2000	7:46:32 AM	dcain	Liquefaction Mode
12	Low	14-Sep-2000	11:32:09 PM	rmccain	liquefaction
07	Low	14-Sep-2000	6:53:16 PM	tposs	Liquefaction
97	Medium	14-Sep-2000	1:09:45 PM	jparris	Turbine
90	Low	13-Sep-2000	11:53:00 PM	rmccain	liquefaction
80	Low	13-Sep-2000	8:26:20 PM	tposs	Liquefaction
79	Low	13-Sep-2000	5:47:07 PM	tposs	Liquefaction
75	Low	13-Sep-2000	2:23:17 PM	jparris	1400 : Running liquid to tank
71	Low	13-Sep-2000	9:48:07 AM	jparris	Timing Change for DEHI's
69	Low	13-Sep-2000	2:23:04 AM	dcain	Liquefaction By Pass Mode
64	Low	12-Sep-2000	5:56:01 PM	tposs	Liquefaction
55	Low	12-Sep-2000	8:48:40 AM	jparris	0735 : Ck'd in with CLNG: Status - S/D
54	Low	12-Sep-2000	2:44:42 AM	dcain	Liquefaction Mode
53	Low	11-Sep-2000	7:46:15 PM	rmccain	Liquefaction
48	Low	11-Sep-2000	2:03:33 PM	jparris	Instrument air
46	Low	11-Sep-2000	8:54:35 AM	jparris	0725 : Ck'd in with CLNG : Running liq @ 85 gpm
435	Low	17-Nov-2000	6:38:58 AM	tposs	Security

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OPERATING LOGBOOK

Plant	Chattanooga LNG
LogBooks	<All>

Printed on:	06-Apr-2001 11:57:24 PM
Printed by:	tposs

LogID	Priority	Date	Time	User	Description
1604	Low	02-Dec-2000	4:12:05 AM	jparris	0410 : Tanker arrived at Chattanooga
1603	Low	02-Dec-2000	3:51:05 AM	jparris	Tanker enroute to Cherokee : 0350
1601	Low	02-Dec-2000	2:26:01 AM	jparris	Tanker enroute to Cherokee : 0225
1600	Low	02-Dec-2000	1:49:56 AM	jparris	TANKER AT CHATTANOOGA 0145
1599	Low	02-Dec-2000	1:07:30 AM	jparris	0105 : Tanker at Chattanooga
1568	Low	01-Dec-2000	6:10:05 AM	jparris	0605 : Tanker arrived from Cherokee
1565	Low	01-Dec-2000	3:02:23 AM	jparris	Tanker enroute to Cher, 0300
560	Low	30-Nov-2000	11:16:10 PM	jparris	2315 : Tanker arrived
443	Low	18-Nov-2000	6:39:58 AM	tposs	Security
314	Low	28-Oct-2000	6:47:31 PM	jparris	Foundation temp is OFF 1830
406	Low	12-Nov-2000	10:17:06 PM	tposs	Security
400	Low	12-Nov-2000	6:10:34 AM	rmccain	Security
397	Low	11-Nov-2000	9:10:01 PM	tposs	Security
290	High	24-Oct-2000	4:01:41 PM	jparris	Boiloff started at 1515
396	Low	11-Nov-2000	6:30:01 AM	rmccain	Security
313	Low	28-Oct-2000	3:01:09 PM	jparris	Foundation Temp in manual 1500 hr
186	Low	07-Oct-2000	10:38:43 AM	jparris	LIQUEFACTION @ 83 GPM
395	Low	10-Nov-2000	6:26:17 PM	tposs	Security
387	Low	09-Nov-2000	6:29:30 PM	tposs	Security
379	Low	08-Nov-2000	9:04:15 PM	tposs	Security
372	Low	07-Nov-2000	6:33:53 PM	tposs	Security
365	Low	06-Nov-2000	10:05:18 PM	rmccain	Security
351	Low	04-Nov-2000	10:45:27 PM	rmccain	security
338	Low	02-Nov-2000	8:31:59 AM	tposs	Security
335	Low	01-Nov-2000	9:13:25 AM	tposs	Security
326	Low	31-Oct-2000	12:25:13 PM	tposs	Security
324	Low	31-Oct-2000	5:54:16 AM	njerniga	security checks ok
311	Low	28-Oct-2000	5:59:33 AM	njerniga	secutity checks
308	Low	27-Oct-2000	2:54:43 PM	rmccain	Security
306	Low	27-Oct-2000	6:14:01 AM	njerniga	security checks
301	Medium	26-Oct-2000	6:48:17 AM	njerniga	report of gas smell
298	Low	26-Oct-2000	5:17:24 AM	njerniga	Plant checks
297	Low	25-Oct-2000	2:51:03 PM	rmccain	Security
296	Low	25-Oct-2000	11:03:06 AM	rmccain	Security
295	Low	24-Oct-2000	11:52:18 PM	tposs	Security
294	Low	24-Oct-2000	10:15:15 PM	jparris	Security & Readings
276	Low	22-Oct-2000	12:07:50 PM	rmccain	Security

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OPERATING LOGBOOK

Plant	Chattanooga LNG
LogBooks	<All>

Printed on:	06-Apr-2001 11:57:24 PM
Printed by:	tposs

LogID	Priority	Date	Time	User	Description
1831	Low	09-Dec-2000	9:50:09 AM	jparris	#102 ENROUTE TO CHEROKEE, 0948
1830	Low	09-Dec-2000	8:46:41 AM	jparris	0842 : #102 AT CHATTANOOGA
1829	Low	09-Dec-2000	8:45:27 AM	jparris	#101 ENROUTE TO CHEROKEE, 0830
1828	Low	09-Dec-2000	7:26:34 AM	jparris	0725 : # 101 at Chattanooga
1827	Low	09-Dec-2000	6:24:56 AM	rmccain	#98, 99 ,100, have been unloaded
1738	Low	06-Dec-2000	6:55:36 AM	jparris	0625 :# 65 AT CHATTANOOGA
1736	Low	06-Dec-2000	5:40:01 AM	jparris	#64 enroute to Cherokee, 0540
1735	Low	06-Dec-2000	4:42:53 AM	jparris	0440 : #64 at Chattanooga
1733	Low	06-Dec-2000	3:15:19 AM	jparris	#63 enroute to Cherokee,0315
1732	Low	06-Dec-2000	2:03:48 AM	jparris	#62 enroute to Cherokee, 0200
1731	Low	06-Dec-2000	2:02:10 AM	jparris	0130 : #63 at Chattanooga
1730	Low	06-Dec-2000	1:59:27 AM	jparris	0040 : #62 at Chattanooga
1728	Low	06-Dec-2000	12:36:21 AM	jparris	#61 ENROUTE TO CHEROKEE, 0035
1727	Low	05-Dec-2000	11:20:18 PM	jparris	#60 ENROUTE TO CHEOKEE
1726	Low	05-Dec-2000	11:18:38 PM	jparris	2315 : #61 AT CHATTANOOGA
1707	Low	05-Dec-2000	6:58:08 AM	jparris	#51 ENROUTE TO CHEROKEE
1705	Low	05-Dec-2000	5:42:40 AM	jparris	0540: #51 at Chattanooga
1703	Low	05-Dec-2000	4:30:58 AM	jparris	#50 ENROUTE TO CHEROKEE, 0430
1702	Low	05-Dec-2000	3:09:27 AM	jparris	0307 #50 AT CHATTANOOGA
1701	Low	05-Dec-2000	3:08:15 AM	jparris	#49 ENROUTE TO CHEROKEE,0305
1700	Low	05-Dec-2000	1:49:34 AM	jparris	0145 : #49 at Chattanooga
1699	Low	05-Dec-2000	1:48:24 AM	jparris	#48 enroute to Cherokee, 0145
1697	Low	05-Dec-2000	12:48:31 AM	jparris	0038 : #48 AT CHATTANOOGA
1696	Low	05-Dec-2000	12:38:56 AM	jparris	#47 enroute to Cherokee: 0028
1695	Low	04-Dec-2000	11:17:44 PM	jparris	2315: #47 at Chattanooga
1660	Low	04-Dec-2000	5:33:56 AM	jparris	#37 ENROUTE TO CHEROKEE 0535
1659	Low	04-Dec-2000	4:27:25 AM	jparris	#38 AT CHATTANOOGA,0415
1658	Low	04-Dec-2000	4:26:04 AM	jparris	#36 ENROUTE TO CHEROKEE 0425
1657	Low	04-Dec-2000	3:30:09 AM	jparris	#37 AT CHATTANOOGA 0315
1656	Low	04-Dec-2000	3:01:00 AM	jparris	# 36 at Chattanooga 0300
1655	Low	04-Dec-2000	1:42:25 AM	jparris	Tanker #35 enroute to Cherokee 0125
1653	Low	04-Dec-2000	12:06:41 AM	jparris	#35 ARRIVED AT CHATTANOOGA,00:06
1652	Low	03-Dec-2000	11:07:16 PM	jparris	# 34 enroute to Cherokee 2300
1629	Low	03-Dec-2000	6:08:05 AM	jparris	#27 at Chattanooga 0600
1627	Low	03-Dec-2000	3:03:46 AM	jparris	0255 : Tanker #26 enroute to Cherokee
1622	Low	02-Dec-2000	11:00:09 PM	jparris	Tanker at Chattanooga 2230
606	Low	02-Dec-2000	5:32:58 AM	jparris	0530 : Tanker enroute to Cherokee

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OPERATING LOGBOOK

Plant	Chattanooga LNG
LogBooks	<All>

Printed on:	06-Apr-2001 11:57:24 PM
Printed by:	tposs

.ogID	Priority	Date	Time	User	Description
645	Low	03-Dec-2000	7:47:32 PM	rmccain	Security
489	Low	28-Nov-2000	6:11:39 AM	njerniga	Plant ok.
486	Low	27-Nov-2000	6:30:22 AM	njerniga	clean-up
583	Low	01-Dec-2000	2:57:35 PM	tposs	Securty
582	Low	01-Dec-2000	2:01:12 PM	tposs	Security L.N.G. truck
572	Low	01-Dec-2000	7:37:44 AM	tposs	Security L.N.G, truck
543	Low	30-Nov-2000	12:20:26 PM	tposs	Security L.N.G. truck
520	Low	29-Nov-2000	7:41:19 PM	rmccain	Security
515	Low	29-Nov-2000	3:36:51 PM	tposs	Securty
492	Low	28-Nov-2000	9:02:47 AM	tposs	Securty
490	Low	28-Nov-2000	7:42:27 AM	tposs	Security
487	Low	27-Nov-2000	7:07:29 AM	tposs	Security
480	Low	25-Nov-2000	2:14:10 PM	tposs	Securty
476	Low	24-Nov-2000	1:14:42 PM	rmccain	Security
467	Low	22-Nov-2000	1:37:40 PM	rmccain	Security
466	Low	22-Nov-2000	6:53:25 AM	tposs	Securty
462	Low	21-Nov-2000	6:53:39 AM	tposs	Security
461	Low	21-Nov-2000	2:03:54 AM	tposs	Cold weather
455	Low	20-Nov-2000	8:16:57 AM	rmccain	Security
449	Low	19-Nov-2000	6:17:46 AM	tposs	Security
444	Low	18-Nov-2000	10:30:09 AM	rmccain	Security
347	Low	03-Nov-2000	10:41:13 PM	rmccain	Testing relief valves
331	Low	31-Oct-2000	11:01:33 PM	rmccain	LNG truck hoses
197	Low	09-Oct-2000	12:57:36 PM	njerniga	air compressors
121	Low	29-Sep-2000	6:43:37 AM	jparris	0644 : Pro-Coat on -site
341	Low	02-Nov-2000	10:11:14 PM	rmccain	testing relief valves
337	Low	01-Nov-2000	10:21:10 PM	rmccain	Relief valves
010	Low	21-Sep-2000	12:46:41 PM	dcain	Update
004	Low	21-Sep-2000	12:20:00 AM	tposs	Standby mode
002	Low	20-Sep-2000	11:59:25 PM	tposs	Standby mode
)13	Low	15-Sep-2000	3:04:55 AM	rmccain	Turbine
)05	Low	14-Sep-2000	5:28:48 PM	tposs	Liquefaction
836	Low	09-Dec-2000	2:43:04 PM	jparris	1440 : # 105 AT CHATTANOOGA
835	Low	09-Dec-2000	2:30:18 PM	jparris	# 104 ENROUTE TO CHEROKEE, 1430
834	Low	09-Dec-2000	1:26:52 PM	jparris	1325 : #104 AT CHATTANOOGA
833	Low	09-Dec-2000	11:20:00 AM	jparris	#103 ENROUTE TO CHEROKEE, 1120
832	Low	09-Dec-2000	10:13:10 AM	jparris	1005 : #103 AT CHATTANOOGA

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OPERATING LOGBOOK

Plant	Chattanooga LNG
LogBooks	<All>

Printed on:	06-Apr-2001 11:57:24 PM
Printed by:	tposs

.ogID	Priority	Date	Time	User	Description
906	Low	12-Dec-2000	9:01:29 AM	jparris	0815 # 136 AT CHATTANOOGA
905	Low	12-Dec-2000	8:59:51 AM	jparris	#135 ENROUTE TO CHEROKEE, 0800
898	Low	12-Dec-2000	4:23:09 AM	rmccain	Security
902	Low	12-Dec-2000	7:31:17 AM	jparris	0655 # 135 AT CHATTANOOGA
901	Low	12-Dec-2000	7:25:45 AM	jparris	Test run of gylcol heater #2
885	Low	11-Dec-2000	1:01:35 PM	jparris	# 128 ENROUTE TO CHEROKEE, 1300
884	Low	11-Dec-2000	12:33:37 PM	jparris	# 126, ENROUTE TO CHEROKEE, 1235----------------
883	Low	11-Dec-2000	12:12:31 PM	jparris	#128 AT CHATTANOOGA
881	Low	11-Dec-2000	11:02:11 AM	jparris	#126 ENROUTE TO CHEROKEE, 1100
871	Low	11-Dec-2000	7:30:05 AM	jparris	0727 : #126 AT CHATTANOOGA
858	Low	10-Dec-2000	2:51:21 PM	jparris	1420 : #118 AT CHATTANOOGA
890	Low	11-Dec-2000	10:45:56 PM	tposs	#131 in 2045 out 2145
889	Low	11-Dec-2000	8:07:50 PM	tposs	#120 in 1900 out 2000
888	Low	11-Dec-2000	6:50:27 PM	tposs	#129 in 1745 out 1845
870	Low	11-Dec-2000	6:37:42 AM	rmccain	Security
869	Low	11-Dec-2000	12:36:01 AM	rmccain	Security Tankers
864	Low	10-Dec-2000	10:07:31 PM	tposs	#121 in 2045 Out2145.
862	Low	10-Dec-2000	8:19:50 PM	tposs	#119 in 1730 out 1830,#120 in 1845 out 2010.
859	Low	10-Dec-2000	3:25:35 PM	tposs	Securty #118 out 1520
857	Low	10-Dec-2000	1:45:09 PM	jparris	#117 ENROUTE TO CHEROKEE
855	Low	10-Dec-2000	12:35:58 PM	jparris	1235 : #117 AT CHATTANOOGA
852	Low	10-Dec-2000	9:15:02 AM	jparris	#115 ENROUTE TO CHEROKEE, 0910
842	Low	09-Dec-2000	10:53:21 PM	tposs	Security #109 in
854	Low	10-Dec-2000	12:21:27 PM	jparris	#116 ENROUTE TO CHEROKEE
840	Low	09-Dec-2000	8:20:58 PM	tposs	#107 in 1945 out 2045.
853	Low	10-Dec-2000	11:19:43 AM	jparris	1118 : #116 AT CHATTANOOGA
838	Low	09-Dec-2000	5:19:40 PM	tposs	1615 #105 out #106 in 1720 #106 out.
768	Low	07-Dec-2000	6:53:57 AM	rmccain	Security
850	Low	10-Dec-2000	8:13:17 AM	jparris	#114 ENROUTE TO CHEROKEE, 0730
849	Low	10-Dec-2000	8:11:47 AM	jparris	0800 : #115 AT CHATTANOOGA
754	Low	06-Dec-2000	8:26:31 PM	tposs	Security L.N.G,trucks
812	Low	08-Dec-2000	10:01:49 PM	tposs	Securty,trucks
785	Low	07-Dec-2000	10:28:10 PM	tposs	Security trucks
783	Low	07-Dec-2000	8:47:09 PM	tposs	Securty Trucks
725	Low	05-Dec-2000	9:12:59 PM	tposs	Security,Trucks
723	Low	05-Dec-2000	6:30:26 PM	tposs	Security
683	Low	04-Dec-2000	5:00:35 PM	rmccain	Repars Status

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OPERATING LOGBOOK

Plant	Chattanooga LNG
LogBooks	<All>

Printed on:	06-Apr-2001 11:57:24 PM
Printed by:	tposs

LogID	Priority	Date	Time	User	Description
2047	Low	15-Dec-2000	6:07:43 AM	tposs	#181 in0315 out 0440,#182 in 0445 out 0600
2046	Low	15-Dec-2000	6:03:18 AM	tposs	#179 in 0015 out 0145,#180 in 0215 out 0330,
2030	Low	14-Dec-2000	2:39:45 PM	jparris	1435 : #171 AT CHATTANOOGA
2029	Low	14-Dec-2000	2:38:05 PM	jparris	# 170 ENROUTE TO CHEROKEE, 1430
2024	Low	14-Dec-2000	1:28:24 PM	jparris	1315 : # 170 AT CHATTANOOGA
2023	Low	14-Dec-2000	1:22:02 PM	jparris	# 169 ENROUTE TO CHEROKEE, 1300
2019	Low	14-Dec-2000	12:06:35 PM	jparris	#168 ENROUTE TO CHEROKEE,1205
2018	Low	14-Dec-2000	11:59:25 AM	jparris	1145 : #169 AT CHATTANOOGA
2017	Low	14-Dec-2000	11:55:21 AM	jparris	#167 ENROUTE TO CHEROKEE, 1000
2014	Low	14-Dec-2000	11:12:30 AM	jparris	1100 : #168 AT CHATTANOOGA
2011	Low	14-Dec-2000	9:10:29 AM	jparris	0900 : #167 AT CHATTANOOGA
2010	Low	14-Dec-2000	9:08:30 AM	jparris	#166 ENROUTE TO CHEROKEE, 0910
2006	Low	14-Dec-2000	8:12:33 AM	jparris	0805 : #166 AT CHATTANOOGA
2005	Low	14-Dec-2000	8:00:05 AM	jparris	#165 ENROUTE TO CHEROKEE, 0800
2003	Low	14-Dec-2000	7:16:02 AM	jparris	0710 # 165 UNLOADING AT CHATTANOOGA
2002	Low	14-Dec-2000	7:12:45 AM	jparris	# 164 ENROUTE TO CHEROKEE,0700
2042	Low	15-Dec-2000	12:45:06 AM	tposs	#177 out 2330 ,#178 in 2315 out 0045
1982	Low	13-Dec-2000	2:49:42 PM	jparris	1445: #156 AT CHATTANOOGA
1980	Low	13-Dec-2000	2:32:55 PM	jparris	1425 : #155 AT CHATTANOOGA
1976	Low	13-Dec-2000	2:22:50 PM	jparris	#154 ENROUTE TO CHEROKEE, 1410
1975	Low	13-Dec-2000	2:21:40 PM	jparris	#153 ENROUTE TO CHEROKEE, 1310
2000	Low	14-Dec-2000	12:38:06 AM	tposs	#162 in 2300 out 2400
972	Low	13-Dec-2000	12:07:18 PM	jparris	1205: #153 AT CHATTANOOGA
971	Low	13-Dec-2000	11:53:45 AM	jparris	# 152 ENROUTE TO CHEROKEE, 1140
968	Low	13-Dec-2000	9:57:37 AM	jparris	#151 ENROUTE TO CHEROKEE, 1000
964	Low	13-Dec-2000	9:23:52 AM	jparris	# 150 ENROUTE TO CHEROKEE,0855
961	Low	13-Dec-2000	8:47:00 AM	jparris	0840 : #151 AT CHATTANOOGA
960	Low	13-Dec-2000	8:17:05 AM	jparris	0800 : #150 AT CHATTANOOGA
959	Low	13-Dec-2000	8:16:00 AM	jparris	#149 ENROUTE TO CHEROKEE, 0800
956	Low	13-Dec-2000	7:18:26 AM	jparris	0545 : #149 AT CHATTANOOGA
954	Low	13-Dec-2000	7:16:41 AM	jparris	#148 ENROUTE TO CHEROKEE, 0705
921	Low	12-Dec-2000	2:29:04 PM	jparris	#138 ENROUTE TO CHEROKEE, 1425
920	Low	12-Dec-2000	2:08:11 PM	jparris	1406 #139 AT CHATTANOOGA
917	Low	12-Dec-2000	1:39:05 PM	jparris	1320 : #138 AT CHATTANOOGA
911	Low	12-Dec-2000	10:21:46 AM	jparris	#137 ENROUTE TO CHEROKEE, 1015
910	Low	12-Dec-2000	10:21:02 AM	jparris	#136 ENROUTE TO CHEROKEE, 0955
907	Low	12-Dec-2000	9:02:40 AM	jparris	0855 #137 AT CHATTANOOGA

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OPERATING LOGBOOK

Plant	Chattanooga LNG
LogBooks	<All>

Printed on:	06-Apr-2001 11:57:24 PM
Printed by:	tposs

LogID	Priority	Date	Time	User	Description
2257	Low	23-Dec-2000	5:06:16 AM	jparris	0505 : GAS CONTROL REQUESTING 1000
2227	Low	21-Dec-2000	9:00:22 PM	jparris	#259 OFF-LOAD COMPLETED, 2050
2226	Low	21-Dec-2000	8:58:56 PM	jparris	1955 : #259 AT CHATTANOOGA
2225	Low	21-Dec-2000	8:57:28 PM	jparris	#258 OFF-LOAD COMPLETED ,1915
2224	Low	21-Dec-2000	5:42:18 PM	jparris	#257 OFF-LOAD COMPLETED, 1730
2222	Low	21-Dec-2000	4:42:18 PM	jparris	1640 : #257 AT CHATTANOOGA
2221	Low	21-Dec-2000	3:39:32 PM	jparris	#256 ENROUTE TO CHEROKEE , 1530
2197	Low	20-Dec-2000	10:00:09 PM	jparris	2120 : #254 AT CHATTANOOGA
2194	Low	20-Dec-2000	7:44:36 PM	jparris	1940 : #253 AT CHATTANOOGA
2193	Low	20-Dec-2000	7:43:20 PM	jparris	1835 : #252 AT CHATTANOOGA
2236	Low	22-Dec-2000	10:57:28 AM	rmccain	Security
2190	Low	20-Dec-2000	6:00:13 PM	jparris	1755 : #251 AT CHATTANOOGA
2189	Low	20-Dec-2000	12:25:30 PM	rmccain	Tanker Off loading resumed at 1215 hrs.
2144	Low	19-Dec-2000	2:41:17 AM	jparris	#240 ENROUTE TO CHEROKEE, 0200
2142	Low	19-Dec-2000	12:54:57 AM	jparris	#239 ENROUTE TO CHEROKEE , 0045
2192	Low	20-Dec-2000	7:40:18 PM	jparris	# 251 ENROUTE TO CHEROKEE, 1900
2141	Low	19-Dec-2000	12:32:02 AM	jparris	0026 : #240 AT CHATTANOOGA
2140	Low	19-Dec-2000	12:29:56 AM	jparris	2348 : #239 AT CHATTANOOGA
2139	Low	19-Dec-2000	12:28:45 AM	jparris	#238 ENROUTE TO CHEROKEE
2138	Low	18-Dec-2000	11:16:27 PM	jparris	2250 : #238 AT CHATTANOOGA
2128	Low	18-Dec-2000	3:00:46 PM	rmccain	B.O. Compressor
2126	Low	18-Dec-2000	6:47:01 AM	rmccain	Securty
2093	Low	16-Dec-2000	2:46:23 PM	rmccain	Off Loaded tankers
2063	Low	15-Dec-2000	12:12:30 PM	jparris	#185 ENROUTE TO CHEROKEE, 1150
2062	Low	15-Dec-2000	11:11:22 AM	jparris	1100 : # 185 AT CHATTANOOGA
2058	Low	15-Dec-2000	9:26:03 AM	jparris	#184 ENROUTE TO CHATTANOOGA
2110	Low	17-Dec-2000	6:44:28 AM	tposs	#213 in 0500 out 0645
2104	Low	17-Dec-2000	2:30:04 AM	tposs	#209 in 0030 out 0130 #210 in 0030 out 0230
2109	Low	17-Dec-2000	6:38:22 AM	tposs	#211in0400 out 0445 #212 in 0500 out0545
2108	Low	17-Dec-2000	5:56:39 AM	tposs	#211 in 0400 out 0445 #212 in 0500 out 0545
2087	Low	16-Dec-2000	6:57:10 AM	tposs	#196 in 0500 out0615 #197 in 0515
084	Low	16-Dec-2000	5:15:12 AM	tposs	#195 out
083	Low	16-Dec-2000	4:22:52 AM	tposs	#193 out #194 in 0300 out 0415 #195 in 0345
055	Low	15-Dec-2000	8:20:16 AM	jparris	0815 : #184 AT CHATTANOOGA
082	Low	16-Dec-2000	1:46:21 AM	tposs	#191 out 2300 #192 in 2345 out 0100 #193 in 0145
054	Low	15-Dec-2000	8:19:05 AM	jparris	#183 ENROUTE TO CHEROKEE, 0705
049	Low	15-Dec-2000	6:24:47 AM	tposs	#183 in 0545

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OPERATING LOGBOOK

Plant	Chattanooga LNG
LogBooks	<All>

Printed on:	06-Apr-2001 11:57:24 PM
Printed by:	tposs

LogID	Priority	Date	Time	User	Description
1272	Low	21-Oct-2000	3:22:10 PM	jparris	Liquefaction , Running 74 gpm's
1271	Low	21-Oct-2000	2:30:22 PM	rmccain	Liquefaction
1270	Low	21-Oct-2000	10:24:20 AM	rmccain	liquefaction
1268	Low	21-Oct-2000	3:39:46 AM	tposs	Liquefaction
1265	Low	20-Oct-2000	4:34:17 AM	tposs	Liquefaction
1257	Low	19-Oct-2000	2:27:02 AM	tposs	Liquefaction
1256	Low	18-Oct-2000	10:45:01 PM	jparris	Liquefaction running well
1249	Low	18-Oct-2000	9:20:42 AM	njerniga	LIQUEFACTION
1248	Low	18-Oct-2000	6:35:16 AM	rmccain	Liquefaction
1244	Low	17-Oct-2000	2:54:56 PM	njerniga	nitrogen
242	High	17-Oct-2000	12:43:12 PM	jparris	Turbine restart
241	High	17-Oct-2000	12:04:46 PM	jparris	Liquefaction
239	Low	17-Oct-2000	4:16:56 AM	rmccain	Liquefaction @ 72gpm
236	Low	16-Oct-2000	8:28:10 PM	tposs	Liquefaction
233	Low	16-Oct-2000	4:15:45 PM	tposs	Standby mode
231	Low	16-Oct-2000	7:42:20 AM	jparris	0720 : Start Turbine
230	Low	16-Oct-2000	12:56:52 AM	rmccain	Standby
229	Low	15-Oct-2000	11:03:45 PM	tposs	Standby mode
225	Low	15-Oct-2000	6:31:52 AM	rmccain	Standby
224	Low	14-Oct-2000	7:55:05 PM	tposs	Standby mode
221	Low	14-Oct-2000	5:42:01 AM	rmccain	Liquefaction
220	Low	13-Oct-2000	7:42:29 PM	tposs	Liquefaction
219	Low	13-Oct-2000	1:29:14 PM	jparris	Water Tower
218	Low	13-Oct-2000	5:57:02 AM	rmccain	Liquefaction
216	Low	12-Oct-2000	7:02:42 PM	tposs	Liquefaction
213	Low	12-Oct-2000	1:12:08 PM	jparris	Water Tower
211	Low	12-Oct-2000	5:58:41 AM	wpye	Pretreatment
212	Low	12-Oct-2000	5:47:37 AM	rmccain	Liquefaction
209	Low	11-Oct-2000	9:31:41 PM	tposs	Liquefaction
208	Low	11-Oct-2000	4:42:05 PM	tposs	Liquefaction
483	Low	03-Jan-2001	2:27:38 PM	njerniga	Vaporized all shift
378	Low	29-Dec-2000	3:07:52 PM	tposs	Security
335	Low	28-Dec-2000	6:47:29 AM	jparris	0646 : #268 AT CHATTANOOGA
334	Low	28-Dec-2000	6:46:47 AM	jparris	#267 enroute to CHEROKEE, 0100
333	Low	28-Dec-2000	12:05:39 AM	jparris	0000 : #267 AT CHATTANOOGA
301	Low	26-Dec-2000	6:25:00 AM	njerniga	0600-Stacy Wood in.
259	Low	23-Dec-2000	6:26:30 AM	jparris	0620 : GAS CONTROL REQUESTED INCREASE TO 1500

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OPERATING LOGBOOK

Plant	Chattanooga LNG
LogBooks	<All>

Printed on:	06-Apr-2001 11:57:24 PM
Printed by:	tposs

LogID	Priority	Date	Time	User	Description
1465	Low	22-Nov-2000	2:14:18 AM	tposs	Cold werther checks
1464	Low	21-Nov-2000	10:01:38 PM	jparris	N2
1463	Low	21-Nov-2000	3:31:13 PM	jparris	1450 : Shamrock Scale Company, Cking scales
1460	Low	20-Nov-2000	4:14:52 PM	njerniga	cold weather precautions,
1454	Low	20-Nov-2000	5:56:49 AM	tposs	Operations
1453	Low	19-Nov-2000	10:22:34 PM	njerniga	Gate
1448	Low	18-Nov-2000	10:33:58 PM	njerniga	Visitor
1442	Low	18-Nov-2000	12:47:14 AM	tposs	Cold temps
1441	Low	17-Nov-2000	10:20:58 PM	njerniga	gravel
1433	Low	16-Nov-2000	5:46:59 PM	njerniga	FERC
1429	Low	15-Nov-2000	10:27:23 PM	njerniga	firetruck
1420	Low	14-Nov-2000	10:15:53 PM	njerniga	freeze precaution
1416	Low	14-Nov-2000	1:07:14 PM	jparris	N2 Purge
1391	Low	10-Nov-2000	7:46:39 AM	njerniga	Rainwater
1383	Low	09-Nov-2000	11:25:00 AM	njerniga	new nitrogen tank
1376	Low	08-Nov-2000	11:39:03 AM	njerniga	meeting
1371	Low	07-Nov-2000	2:44:32 PM	njerniga	damage removal
1363	Low	06-Nov-2000	4:06:04 PM	njerniga	purge
1362	Low	06-Nov-2000	11:47:29 AM	njerniga	wire delivery
1361	Low	06-Nov-2000	10:43:49 AM	njerniga	plant work
1357	Low	05-Nov-2000	9:46:14 PM	rmccain	Security
1355	Low	05-Nov-2000	2:14:57 PM	njerniga	refrigerant
1348	Low	04-Nov-2000	2:08:04 PM	njerniga	plant check
1342	Low	02-Nov-2000	10:20:01 PM	rmccain	Security
1336	Low	01-Nov-2000	9:37:48 PM	rmccain	B.O. Compressor
1333	Low	01-Nov-2000	6:28:29 AM	njerniga	lng trucks
1329	Low	31-Oct-2000	10:52:59 PM	rmccain	Security
1322	Low	30-Oct-2000	2:12:39 PM	tposs	Shutdown Mode
1320	Low	30-Oct-2000	4:43:25 AM	njerniga	check of plant
1319	Low	29-Oct-2000	5:53:50 AM	njerniga	time change
1312	Low	28-Oct-2000	2:11:35 PM	tposs	Standby Mode
1286	Low	24-Oct-2000	5:37:35 AM	tposs	Standby mode
1285	Low	24-Oct-2000	2:27:05 AM	tposs	Standby Mode
1284	High	23-Oct-2000	11:19:09 PM	jparris	Status : Chattanooga situation
1281	Low	23-Oct-2000	1:09:02 AM	tposs	Liquefaction
1277	Low	22-Oct-2000	2:27:02 PM	rmccain	Liquefaction
1275	Low	21-Oct-2000	11:52:00 PM	tposs	Liquefaction

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OPERATING LOGBOOK

Plant	Chattanooga LNG
LogBooks	<All>

Printed on:	06-Apr-2001 11:57:24 PM
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LogID	Priority	Date	Time	User	Description
1846	Low	10-Dec-2000	3:18:51 AM	rmccain	Instrument air system
1841	Low	09-Dec-2000	8:58:48 PM	tposs	#108 in
1796	Low	08-Dec-2000	8:02:25 AM	njerniga	Boil-Off Shutdown
1794	Low	08-Dec-2000	6:13:58 AM	rmccain	B.O. Comp.
1776	Low	07-Dec-2000	2:15:17 PM	njerniga	Test run
1775	High	07-Dec-2000	12:29:18 PM	njerniga	Vaporization test run.
1758	Low	07-Dec-2000	1:16:35 AM	rmccain	Cold Weather
1750	Low	06-Dec-2000	2:26:37 PM	njerniga	LNG PUMPS
1720	Low	05-Dec-2000	2:48:05 PM	njerniga	TANKERS.
1694	Low	04-Dec-2000	10:18:24 PM	rmccain	Cold Weather Pritection
1693	Low	04-Dec-2000	9:45:03 PM	rmccain	B.O. Comp
1678	Low	04-Dec-2000	2:29:59 PM	njerniga	Tankers
1663	Low	04-Dec-2000	6:45:10 AM	jparris	#38 ENROUTE TO CHEROKEE 0635
1651	Low	03-Dec-2000	10:23:53 PM	jparris	2200 : N2 and water bleeds
1647	Low	03-Dec-2000	8:55:52 PM	rmccain	B.O. Comp.
1644	Low	03-Dec-2000	5:49:34 PM	rmccain	Tanker
1640	Low	03-Dec-2000	2:06:31 PM	njerniga	TANKER
1630	Low	03-Dec-2000	6:38:04 AM	jparris	#28 at Chattanooga 0630
1626	Low	03-Dec-2000	1:37:54 AM	jparris	Tanker #26 at Chattanooga 0130 hrs
1625	Low	03-Dec-2000	12:04:37 AM	jparris	Tanker enroute to Cherokee 00:00
1624	Low	02-Dec-2000	11:18:29 PM	jparris	Tanker #25 at Chattanooga 2310
1614	Low	02-Dec-2000	6:02:00 PM	rmccain	Glycol Pump
1609	Low	02-Dec-2000	2:57:11 PM	njerniga	Boil-off.
1564	Low	01-Dec-2000	1:33:16 AM	jparris	Tanker enroute to Cherokee 0055
1558	Low	30-Nov-2000	10:42:46 PM	rmccain	Operations
1530	Low	30-Nov-2000	6:28:22 AM	jparris	Truck unloading
1524	Low	29-Nov-2000	11:53:56 PM	rmccain	Truck unloading
1512	Low	29-Nov-2000	2:34:48 PM	wpye	Standby
1499	Low	29-Nov-2000	12:34:07 AM	njerniga	LNG tanket truck 1st load
1494	Low	28-Nov-2000	11:27:38 PM	rmccain	LNG TANKERS
1493	Low	28-Nov-2000	4:27:50 PM	rmccain	Instrument air
1484	Low	26-Nov-2000	2:21:10 PM	tposs	0700-1500 shift
1483	Low	26-Nov-2000	6:44:32 AM	njerniga	Plant check
1479	Low	25-Nov-2000	6:12:38 AM	njerniga	Plant status.
1475	Low	24-Nov-2000	6:07:05 AM	njerniga	Plant ok.
1472	Low	23-Nov-2000	1:52:49 PM	rmccain	Operations
1471	Low	23-Nov-2000	6:21:21 AM	njerniga	Plant status.

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OPERATING LOGBOOK

Plant	Chattanooga LNG
LogBooks	<All>

Printed on:	06-Apr-2001 11:57:24 PM
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LogID	Priority	Date	Time	User	Description
2188	Low	20-Dec-2000	11:45:10 AM	rmccain	Vaporization Down per load control.
2182	Low	20-Dec-2000	9:41:31 AM	rmccain	Vaporization
2177	Low	20-Dec-2000	7:42:03 AM	rmccain	Vaporization
2174	Low	20-Dec-2000	3:55:27 AM	tposs	Vaporizing
2173	Low	20-Dec-2000	12:13:19 AM	tposs	Vaporizing
2170	Low	19-Dec-2000	9:30:14 PM	jparris	2120 : VAPORIZATION
2167	Low	19-Dec-2000	7:15:47 PM	jparris	#249 OFF-LOADING
2164	Low	19-Dec-2000	5:54:12 PM	jparris	#248 OFF-LOADING
2163	Low	19-Dec-2000	5:48:36 PM	jparris	#247 OFF-LOADED
2162	Low	19-Dec-2000	5:44:20 PM	jparris	#246 OFF-LOADED
2161	Low	19-Dec-2000	2:23:37 PM	rmccain	Tankers
2151	Low	19-Dec-2000	11:10:40 AM	rmccain	Tankers
2145	Low	19-Dec-2000	6:32:17 AM	jparris	0400 : HALTED TRUCKING , ICY CONDITIONS
2137	Low	18-Dec-2000	10:01:11 PM	njerniga	tankers
2125	Medium	18-Dec-2000	4:14:30 AM	rmccain	Tankers
2124	Low	17-Dec-2000	11:16:53 PM	njerniga	Vaporization-Maybe
2116	Low	17-Dec-2000	3:11:25 PM	rmccain	Continued to off load tankers
2113	Low	17-Dec-2000	9:39:12 AM	rmccain	Heater B-201
2111	Low	17-Dec-2000	7:49:03 AM	rmccain	B.O. Comp
2097	Low	16-Dec-2000	9:36:44 PM	njerniga	LNG tankers
2096	Low	16-Dec-2000	9:30:27 PM	njerniga	Storm Warning
2077	Low	15-Dec-2000	8:58:19 PM	njerniga	Tankers
2037	Low	14-Dec-2000	6:41:32 PM	njerniga	Demonstration
2034	Low	14-Dec-2000	4:35:28 PM	njerniga	LNG pump test.
2026	Medium	14-Dec-2000	2:16:05 PM	jparris	TANKER LINE SURVEY TO TANK
2022	Medium	14-Dec-2000	1:52:44 PM	jparris	LATE ENTRY: TANKER INCIDENT
1993	Low	13-Dec-2000	6:35:40 PM	njerniga	Nitrogen delivery
1984	High	13-Dec-2000	2:51:45 PM	jparris	FIRE PROTECTION PANEL
1962	High	13-Dec-2000	8:55:12 AM	jparris	FIRE PROTECTION PANEL
1953	Low	13-Dec-2000	6:16:26 AM	rmccain	Tankers
1943	Low	12-Dec-2000	10:57:19 PM	njerniga	Plant id tags
1941	Low	12-Dec-2000	10:10:58 PM	njerniga	PLANT OK
1913	Low	12-Dec-2000	10:51:53 AM	jparris	LNG pump
1912	Low	12-Dec-2000	10:50:31 AM	jparris	BOILOFF
1899	Low	12-Dec-2000	6:09:27 AM	rmccain	Cold weather
1882	Low	11-Dec-2000	12:04:43 PM	jparris	CORRECTION !!!!! #127 ENROUTE TO CHEROKEE, 1100
848	High	10-Dec-2000	6:08:22 AM	rmccain	Injury

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OPERATING LOGBOOK

Plant	Chattanooga LNG
LogBooks	<All>

Printed on:	06-Apr-2001 11:57:24 PM
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LogID	Priority	Date	Time	User	Description
2493	Low	03-Jan-2001	10:26:09 PM	tposs	Vaporization
2491	Low	03-Jan-2001	8:43:24 PM	tposs	Vaporization
2489	Low	03-Jan-2001	7:42:42 PM	tposs	Emergency generator test
2485	Low	03-Jan-2001	3:19:28 PM	tposs	Vaporization
2480	Low	03-Jan-2001	5:49:16 AM	jparris	0550 : Vaporization
2479	Low	03-Jan-2001	4:45:36 AM	jparris	0435 : Start up of vaporization
2478	Low	03-Jan-2001	4:30:38 AM	jparris	0425 : Gas Control requesting 800
2477	Low	03-Jan-2001	4:23:20 AM	jparris	0415 : Received call, from Gas Control, to Standby
2471	Low	02-Jan-2001	5:33:04 PM	tposs	Vaporizing
2458	Low	02-Jan-2001	12:56:54 PM	njerniga	vaporization
2449	Low	02-Jan-2001	5:22:10 AM	jparris	0415 : Gas Control requesting 1500
2446	Medium	01-Jan-2001	7:44:54 PM	jparris	ELECTRICAL
2443	Low	01-Jan-2001	5:19:32 PM	njerniga	Vaporization
2422	Low	31-Dec-2000	5:40:57 PM	rmccain	Gas Control
2406	Low	30-Dec-2000	11:01:57 PM	jparris	VAPORIZATION
2404	Low	30-Dec-2000	8:57:56 PM	rmccain	Vaporization
2403	Low	30-Dec-2000	7:52:35 PM	rmccain	Stand by
2386	Low	29-Dec-2000	10:48:32 PM	rmccain	Emergency Generator EG-101
2361	Low	28-Dec-2000	9:59:45 PM	rmccain	Closed Valves to Truck loading.
2356	Low	28-Dec-2000	7:18:31 PM	rmccain	Tankers
2331	Low	27-Dec-2000	9:49:10 PM	rmccain	Tankers
2323	Low	27-Dec-2000	11:24:53 AM	tposs	LNG trucks
2319	Low	27-Dec-2000	6:09:40 AM	njerniga	Tanker
2312	Low	26-Dec-2000	6:36:20 PM	rmccain	Tankers
2310	Low	26-Dec-2000	4:47:38 PM	rmccain	Tankers
2299	Low	26-Dec-2000	5:29:47 AM	njerniga	plant ok
2291	Low	25-Dec-2000	12:10:19 PM	tposs	Plant checks
2284	Low	25-Dec-2000	6:11:35 AM	njerniga	BOIL OFF COMP.
2274	Low	24-Dec-2000	6:16:18 AM	njerniga	No vaporization.
2262	Low	23-Dec-2000	9:35:25 AM	tposs	Vaporizing
2256	Low	23-Dec-2000	4:55:01 AM	jparris	CK'D WITH GAS CONTROL
2243	Low	22-Dec-2000	10:13:31 PM	jparris	VAPORIZATION
2241	Low	22-Dec-2000	5:56:47 PM	tposs	Vaporizing
2233	Low	22-Dec-2000	5:36:55 AM	njerniga	Vaporization
2220	Low	21-Dec-2000	2:31:24 PM	rmccain	Vaporization
2216	Low	21-Dec-2000	11:51:53 AM	rmccain	Vaporization
2213	Low	21-Dec-2000	6:21:46 AM	njerniga	Vaporization

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OPERATING LOGBOOK

Plant	Chattanooga LNG
LogBooks	<All>

Printed on:	06-Apr-2001 11:57:24 PM
Printed by:	tposs

LogID	Priority	Date	Time	User	Description
2680	Low	13-Jan-2001	8:16:59 AM	rmccain	Security
2677	Low	12-Jan-2001	10:26:15 PM	njerniga	TANKER OFF-LOADING CONTINUES.
2668	Low	12-Jan-2001	2:25:00 PM	jparris	Tankers in from Trussville 1330 & 1420
2666	Low	12-Jan-2001	6:00:16 AM	tposs	LNG. TANKERS
2662	Low	11-Jan-2001	10:24:23 PM	njerniga	Purge,tankers,
2632	Low	10-Jan-2001	7:08:21 PM	njerniga	1700-UV set to normal.
2661	Low	11-Jan-2001	10:21:30 PM	njerniga	Visitors
2640	High	11-Jan-2001	9:46:40 AM	jparris	Vaporization pumps
2638	Low	11-Jan-2001	5:54:16 AM	tposs	LNG. tankers
2631	Low	10-Jan-2001	7:00:03 PM	njerniga	GYLCOL
2628	Medium	10-Jan-2001	2:16:06 PM	jparris	Vaporization /Tanker unloading
2617	Low	10-Jan-2001	5:26:07 AM	rmccain	Vaporization
2616	Low	10-Jan-2001	4:04:41 AM	rmccain	Tankers
2613	Low	09-Jan-2001	10:26:13 PM	njerniga	Off-loaded 2 tankers
2615	Low	10-Jan-2001	2:49:33 AM	rmccain	Vaporization
2610	Low	09-Jan-2001	9:40:52 PM	njerniga	vaporization
2604	Low	09-Jan-2001	4:29:10 PM	njerniga	Boil-Off compressor restart 1620.
2598	Low	09-Jan-2001	2:32:26 PM	jparris	I-1 SHUTDOWN SYSTEM
2578	Low	09-Jan-2001	4:49:22 AM	rmccain	Security
2587	Low	09-Jan-2001	10:38:45 AM	jparris	Tankers
2585	Low	09-Jan-2001	7:37:48 AM	jparris	0735: STOPPED VAPORIZATION
2584	Medium	09-Jan-2001	7:28:43 AM	jparris	VAPORIZATION
2564	Medium	08-Jan-2001	1:44:33 PM	jparris	Gas Control requesting vaporization at 700 minimum
2562	Low	08-Jan-2001	6:14:04 AM	rmccain	Security
2540	Low	05-Jan-2001	10:17:57 PM	tposs	Dike pump off 2100hrs
2582	Low	09-Jan-2001	6:44:29 AM	rmccain	Vaporization
2576	Medium	09-Jan-2001	3:21:42 AM	rmccain	B.O. Compressor
2570	Low	08-Jan-2001	7:35:16 PM	tposs	Vaporization
2525	Low	05-Jan-2001	12:57:32 AM	rmccain	Security
2520	Low	04-Jan-2001	9:19:01 PM	tposs	Secuty
2569	Low	08-Jan-2001	6:13:59 PM	tposs	LNG. tankers
2560	Medium	08-Jan-2001	4:18:08 AM	rmccain	LNG Line change over
2509	Low	04-Jan-2001	1:15:33 PM	njerniga	Stop vaporization at 1000
2549	Low	06-Jan-2001	10:24:12 PM	tposs	Cold weather precautions
2542	Low	06-Jan-2001	6:25:39 AM	rmccain	Cold Weather
2521	Low	04-Jan-2001	10:26:17 PM	tposs	Plant shut down- I-1
2498	Low	04-Jan-2001	6:36:15 AM	rmccain	Security

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ogo image here!!!

OPERATING LOGBOOK

Plant	Chattanooga LNG
LogBooks	<All>

Printed on:	06-Apr-2001 11:57:24 PM
Printed by:	tposs

ogID	Priority	Date	Time	User	Description
358	Low	27-Jan-2001	11:05:41 PM	jparris	N2 is on at B/O and water bleeds are on.
355	Low	27-Jan-2001	8:59:06 PM	rmccain	Air compressors
348	Low	26-Jan-2001	2:51:36 PM	rmccain	1345 hrs Estes Express lines in.
337	Low	25-Jan-2001	10:09:26 PM	rmccain	Cold weather precautions.
335	Low	25-Jan-2001	5:22:06 PM	rmccain	U.V.System in normal at 1715 hrs.
334	Low	25-Jan-2001	2:46:36 PM	tposs	Tankers
333	Low	25-Jan-2001	12:49:54 PM	tposs	Security
331	Low	25-Jan-2001	11:37:04 AM	tposs	Security
314	Low	24-Jan-2001	9:06:13 AM	tposs	UV. detector on bypass
318	Low	24-Jan-2001	6:27:23 PM	rmccain	UV system in normal 1700 hrs
304	Low	23-Jan-2001	10:22:39 PM	rmccain	Tankers
316	Low	24-Jan-2001	2:16:37 PM	tposs	Tankers
300	Low	23-Jan-2001	2:50:01 PM	tposs	Tankers
799	Low	23-Jan-2001	8:40:57 AM	tposs	Operations
302	Low	23-Jan-2001	6:37:37 PM	rmccain	1700 hrs UV system in normal
795	Low	23-Jan-2001	6:17:17 AM	njerniga	Security and equipment ok.
789	Low	22-Jan-2001	5:30:13 PM	tposs	Tankers
778	Low	22-Jan-2001	6:09:02 AM	njerniga	Took cold weather precautions.
774	Low	21-Jan-2001	4:45:49 PM	tposs	OPERATIONS
769	Low	21-Jan-2001	6:30:09 AM	njerniga	N2, H20, Heatlamps on.
767	Low	20-Jan-2001	6:28:50 PM	tposs	Security
757	Low	19-Jan-2001	5:57:00 PM	jparris	Tankers
752	Low	19-Jan-2001	5:24:46 AM	njerniga	Heavy rain all shift
740	Low	18-Jan-2001	5:55:29 AM	njerniga	UV to normal.
728	Low	17-Jan-2001	7:00:24 AM	rmccain	U.V. System in by-pass
726	Low	17-Jan-2001	6:08:24 AM	tposs	LNG. TANKERS
718	Medium	16-Jan-2001	7:34:14 AM	rmccain	Welding on site
716	Low	16-Jan-2001	5:50:02 AM	tposs	C-103-B,IA compressor
700	Low	15-Jan-2001	7:32:19 AM	rmccain	Tankers will start later today due to dense FOG.
714	Low	16-Jan-2001	4:01:32 AM	tposs	LNG. Tankers
710	Low	15-Jan-2001	10:17:29 PM	njerniga	tankers
703	Low	15-Jan-2001	11:00:26 AM	rmccain	Security
702	Low	15-Jan-2001	8:33:58 AM	rmccain	U.V. Detection in By-Pass, LNG PUMP lock out.
699	Low	15-Jan-2001	6:42:06 AM	tposs	Security
696	Low	14-Jan-2001	10:08:08 PM	njerniga	Off-loaded 2 tankers
690	Low	14-Jan-2001	5:41:07 AM	tposs	Security
683	Low	13-Jan-2001	2:55:28 PM	rmccain	Off Loaded two tankers

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OPERATING LOGBOOK

Plant	Chattanooga LNG
LogBooks	<All>

Printed on:	06-Apr-2001 11:57:24 PM
Printed by:	tposs

LogID	Priority	Date	Time	User	Description
3025	Low	11-Feb-2001	5:35:05 AM	tposs	TANKERS
3024	Low	11-Feb-2001	2:27:34 AM	tposs	Cold weather precautions in effect.
3021	Low	10-Feb-2001	10:43:05 PM	njerniga	TANKERS
3016	Low	10-Feb-2001	5:13:37 AM	tposs	Trucking
3002	Low	09-Feb-2001	4:10:44 AM	tposs	Trucking
2990	Low	08-Feb-2001	4:16:59 AM	tposs	Trucking
2973	Low	07-Feb-2001	5:12:12 AM	rmccain	N2 and water bleeds open at 0200hrs.
2959	Low	06-Feb-2001	2:37:30 AM	rmccain	Water bleeds open, N2 on B.O. Comp. at 0200hrs.
2970	Low	06-Feb-2001	9:49:10 PM	njerniga	UV to normal.
957	Low	05-Feb-2001	10:12:01 PM	tposs	Trucking
956	Low	05-Feb-2001	5:51:56 PM	tposs	Security
949	Low	05-Feb-2001	4:29:08 AM	rmccain	Switched I/A compressors "A", is on.
948	Low	04-Feb-2001	11:53:20 PM	rmccain	2345 Hrs N2 off B.O. Comp.
946	Low	04-Feb-2001	10:00:26 PM	tposs	Trucking
939	Low	03-Feb-2001	10:18:20 PM	tposs	Trucking
932	Low	02-Feb-2001	9:51:30 PM	tposs	Trucking
931	Low	02-Feb-2001	6:21:08 PM	tposs	Cold weather precautions in effect
928	Low	02-Feb-2001	2:30:22 PM	njerniga	x-rays
925	Low	02-Feb-2001	7:59:53 AM	njerniga	vaporizer check-out.
922	Low	02-Feb-2001	6:17:23 AM	rmccain	Cold Weather Precautions
901	Low	31-Jan-2001	2:26:56 PM	njerniga	Received 6 more orbit valves today.
897	Low	31-Jan-2001	9:37:35 AM	njerniga	UV system in bypass.
890	Low	30-Jan-2001	9:03:33 PM	tposs	Security
883	Medium	30-Jan-2001	6:38:35 AM	jparris	U.V. is in BYPASS, 0635
921	Low	01-Feb-2001	10:29:21 PM	tposs	Trucking
919	Low	01-Feb-2001	7:54:13 PM	tposs	UV;Status
915	Low	01-Feb-2001	2:12:30 PM	njerniga	UV set in bypass.
908	Low	01-Feb-2001	4:56:24 AM	rmccain	Cold weather precautions.
906	Low	31-Jan-2001	10:34:00 PM	tposs	UV. in normal 1700hrs
905	Low	31-Jan-2001	10:26:44 PM	tposs	Trucking
878	Low	29-Jan-2001	6:14:51 PM	rmccain	1730 hrs UV system in normal.
899	Low	31-Jan-2001	12:34:44 PM	njerniga	Insurance meeting.
891	Low	30-Jan-2001	10:43:38 PM	tposs	Operations
889	Low	30-Jan-2001	5:33:45 PM	tposs	Security
877	Low	29-Jan-2001	5:00:30 PM	rmccain	B.O. Compressor
874	Low	29-Jan-2001	7:53:20 AM	njerniga	UV in bypass mode.
869	Low	28-Jan-2001	7:03:17 PM	rmccain	OPERATIONS

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OPERATING LOGBOOK

Plant	Chattanooga LNG
LogBooks	<All>

Printed on:	06-Apr-2001 11:57:24 PM
Printed by:	tposs

LogID	Priority	Date	Time	User	Description
3288	Low	03-Mar-2001	8:43:58 PM	tposs	Security
3280	Low	02-Mar-2001	8:20:44 PM	tposs	Paving Contractors
3258	Low	01-Mar-2001	6:43:39 AM	rmccain	Security
3253	Low	28-Feb-2001	5:29:07 PM	tposs	Security
3172	Low	22-Feb-2001	9:06:33 PM	rmccain	Security
3169	Low	22-Feb-2001	2:18:07 PM	tposs	TANKERS
3164	Low	21-Feb-2001	10:31:58 PM	rmccain	Biol Off Comp.
3162	Low	21-Feb-2001	4:21:10 PM	rmccain	1620hrs UV System in normal.
3153	Low	20-Feb-2001	5:42:54 PM	rmccain	1745 hrs UV system in normal.
3159	Low	21-Feb-2001	1:11:16 PM	tposs	TANKERS
3158	Low	21-Feb-2001	7:40:42 AM	tposs	Hazard Detection
3156	Low	21-Feb-2001	6:13:52 AM	njerniga	TANKERS OUT---0500
3149	Low	20-Feb-2001	1:21:06 PM	tposs	Pro-coat
3140	Low	19-Feb-2001	2:26:19 PM	tposs	TRUCKING
3133	Low	19-Feb-2001	6:21:29 AM	njerniga	0345-TANKERS OUT.
3127	Low	18-Feb-2001	2:27:27 PM	tposs	TRUCKING
3122	Low	18-Feb-2001	5:39:54 AM	njerniga	Took cold weather precautions.
3116	Low	17-Feb-2001	1:36:10 PM	tposs	TRUCKING
3110	Low	17-Feb-2001	6:00:02 AM	njerniga	B.O. MOTOR NOISE
3095	Low	16-Feb-2001	6:01:23 AM	njerniga	0500hrs. tankers left plant.
3091	Low	15-Feb-2001	2:02:10 PM	rmccain	Player & Co. working on site today.
3077	Low	14-Feb-2001	2:56:36 PM	jparris	Sexton
3087	Low	15-Feb-2001	12:02:58 PM	rmccain	UV system in normal at 1130
3068	Low	14-Feb-2001	5:15:40 AM	tposs	TRUCKING
3062	Low	13-Feb-2001	3:17:21 PM	jparris	I/1 Shutdown
3056	Low	13-Feb-2001	7:27:57 AM	rmccain	0715 hrs UV system in by pass for contractors.
3086	Low	15-Feb-2001	9:24:18 AM	rmccain	0815 hrs UV system in by-pass for welding.
3047	Low	12-Feb-2001	10:10:34 PM	njerniga	TANKERS
3053	Low	13-Feb-2001	6:46:59 AM	tposs	TRUCKING
3040	Low	12-Feb-2001	8:13:17 AM	rmccain	Player And Co. in at 0700 hrs.
039	Low	12-Feb-2001	6:38:40 AM	tposs	TRUCKING
081	Low	15-Feb-2001	5:47:58 AM	njerniga	0400 TO 0500 Tankers left plant.
075	Low	14-Feb-2001	2:10:00 PM	rmccain	UV system in by-pass 0730 hrs for welding.
043	Low	12-Feb-2001	2:46:56 PM	rmccain	1430 UV system in normal
074	Low	14-Feb-2001	9:24:22 AM	rmccain	Security
028	Low	11-Feb-2001	10:13:05 AM	rmccain	N2 and water bleeds off at 1000 hrs.
027	Low	11-Feb-2001	9:37:21 AM	rmccain	Emergency G enerators

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OPERATING LOGBOOK

Plant	Chattanooga LNG
LogBooks	<All>

Printed on:	06-Apr-2001 11:57:24 PM
Printed by:	tposs

LogID	Priority	Date	Time	User	Description
3567	Low	28-Mar-2001	7:50:27 AM	lguy	0700/1500
3555	Low	27-Mar-2001	12:09:39 PM	lguy	0700/1500
3545	Low	26-Mar-2001	11:14:54 AM	lguy	0700-1500 Security
3565	Low	28-Mar-2001	6:09:28 AM	njerniga	I/A compressors
3514	Low	23-Mar-2001	6:03:14 AM	tposs	OPERATIONS
3502	Low	22-Mar-2001	6:19:24 AM	tposs	OPERATIONS
3563	Low	27-Mar-2001	10:00:33 PM	tposs	1500-2300 Shift
3554	Low	27-Mar-2001	12:04:24 PM	lguy	0700/1500
3546	Low	26-Mar-2001	11:33:48 AM	lguy	0700/1500 Standby
3497	Low	21-Mar-2001	8:24:47 PM	rmccain	Operations
3496	Low	21-Mar-2001	8:19:33 AM	dwebster	0700-1500
3537	Low	25-Mar-2001	9:55:28 PM	rmccain	L. Guy on site 1900hrs
3529	Low	24-Mar-2001	9:56:28 PM	rmccain	Operations
3488	Low	21-Mar-2001	6:17:03 AM	njerniga	LIGHT RAIN
3519	Low	23-Mar-2001	7:51:48 AM	dwebster	0700-1500
3486	Low	20-Mar-2001	8:42:01 PM	rmccain	Operations
3483	Low	20-Mar-2001	3:59:12 PM	rmccain	Holox in with n2
3482	Low	20-Mar-2001	2:20:39 PM	dwebster	0700-1500
3477	Low	20-Mar-2001	6:03:04 AM	njerniga	Heavy Rain
3475	Low	19-Mar-2001	10:22:49 PM	tposs	OPERATIONS
3471	Low	19-Mar-2001	2:24:05 PM	rmccain	Compressor Oil
3470	Low	19-Mar-2001	2:21:46 PM	rmccain	Weed Control
3468	Low	19-Mar-2001	12:05:54 PM	rmccain	Rotate instrument air compressors/ C-103A on line
3460	Low	19-Mar-2001	6:04:47 AM	njerniga	2000-DORSEY CHECKED IN.
3457	Low	18-Mar-2001	4:36:25 PM	tposs	OPERATIONS
3311	Low	06-Mar-2001	4:11:57 AM	rmccain	Cold weather precautions, at 0330 hrs temp 33.
3298	Low	05-Mar-2001	5:09:00 AM	rmccain	Rotated instrument air compressors
3277	Low	02-Mar-2001	2:04:10 PM	njerniga	RECEIVED NITROGEN .
3305	Low	05-Mar-2001	4:17:09 PM	asmith	Standby Mode 0700/1500
3270	Low	01-Mar-2001	6:08:56 PM	tposs	Hazard Detection
3265	Low	01-Mar-2001	2:06:59 PM	njerniga	Florida LNG.
3232	Low	27-Feb-2001	12:16:53 PM	njerniga	LNG TRUCKING COMPLETED!
3195	Low	25-Feb-2001	10:37:59 PM	rmccain	Tankers
3191	Low	25-Feb-2001	6:35:57 AM	jparris	0620 :BOILOFF
3189	Medium	25-Feb-2001	5:39:20 AM	jparris	0530 : I/0 s/d due to storm
3186	Low	24-Feb-2001	10:02:48 PM	rmccain	Tankers
3179	Low	23-Feb-2001	2:48:01 PM	tposs	TANKERS

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OPERATING LOGBOOK

Plant	Chattanooga LNG
LogBooks	<All>

Printed on:	06-Apr-2001 11:57:24 PM
Printed by:	tposs

LogID	Priority	Date	Time	User	Description
3381	Low	11-Mar-2001	10:15:57 PM	njerniga	Pumped out dike pond.
3373	Low	10-Mar-2001	10:01:43 PM	njerniga	Plant and security checks ok.
3389	Low	12-Mar-2001	5:31:17 PM	njerniga	UV to normal.
3386	Low	12-Mar-2001	7:14:50 AM	rmccain	Operations
3384	Low	12-Mar-2001	5:58:18 AM	tposs	OPERATIONS
3375	Low	11-Mar-2001	6:09:59 AM	tposs	OPERATIONS
3370	Low	10-Mar-2001	1:13:56 PM	rmccain	B.O. Comp & PV-55
3367	Low	10-Mar-2001	6:32:45 AM	tposs	OPERATIONS
3360	Low	09-Mar-2001	8:08:56 AM	asmith	Standby Mode 0700 / 1500 Shift
3356	Low	09-Mar-2001	5:59:34 AM	tposs	OPERATIONS
3348	Low	08-Mar-2001	7:57:46 AM	asmith	Standby Mode 0700 / 1500 Shift
3344	Low	08-Mar-2001	1:37:31 AM	tposs	Cold weather precautions
3336	Low	07-Mar-2001	4:44:35 PM	njerniga	Ordered 3 drums of Suniso 4GS.
3332	Low	07-Mar-2001	9:46:24 AM	asmith	Vaporizing 0700 / 1500 Shift
3331	Low	07-Mar-2001	5:53:08 AM	rmccain	0435 Gas Control said start at min rate.
3329	Low	07-Mar-2001	4:53:49 AM	rmccain	0430 Hrs Started glycol pumps and heaters.
3326	Low	06-Mar-2001	8:46:02 PM	njerniga	Added oil
3643	Low	03-Apr-2001	10:44:21 PM	njerniga	PURGE
3640	Low	03-Apr-2001	2:45:00 PM	dnewbern	0700-1500 Shutdown
3638	Low	03-Apr-2001	5:29:46 AM	rmccain	2300-0700 shift
3634	Low	02-Apr-2001	9:55:22 PM	tposs	1500-2300 Shift.
3631	Low	02-Apr-2001	2:30:00 PM	dnewbern	0700-1500 Shutdown
3629	Low	02-Apr-2001	3:49:55 AM	rmccain	Operations
3625	Low	01-Apr-2001	10:24:12 PM	tposs	1100-2300 Shift.
3620	Low	01-Apr-2001	3:10:27 AM	rmccain	Time Change; Operations
3618	Low	01-Apr-2001	1:57:34 AM	rmccain	Secured Vaporization
3615	Low	31-Mar-2001	10:18:25 PM	tposs	1100-2300 Shift.
3611	Low	31-Mar-2001	6:59:39 AM	rmccain	operations
3607	Low	30-Mar-2001	10:21:55 PM	tposs	1500-2300 Shift.
3602	Low	30-Mar-2001	8:58:25 AM	lguy	0700/1500
3598	Low	30-Mar-2001	8:56:34 AM	lguy	0700/1500
3590	Low	29-Mar-2001	10:11:32 PM	tposs	1500-2300 Shift.
3585	Low	29-Mar-2001	8:09:16 AM	lguy	0700/1500
3580	Low	29-Mar-2001	8:06:30 AM	lguy	0700/1500
3572	Low	28-Mar-2001	9:24:24 PM	tposs	1500-2300 Shift
3312	Low	06-Mar-2001	6:01:40 AM	rmccain	0400 Started P201A&C And B201
3568	Low	28-Mar-2001	7:54:24 AM	lguy	0700/1500 Security

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OPERATING LOGBOOK

Plant	Chattanooga LNG
LogBooks	<All>

Printed on:	06-Apr-2001 11:57:24 PM
Printed by:	tposs

Log Book Filtering Applied:

Priority Filter:	Show entries with High, Medium and Low Priority
Time Filter:	Not Applied
Text Filter1:	Not Applied
Text Filter2:	Not Applied
Text Filter3:	856

Log Book Audit List:

LogID	Priority	Date	Time	User	Description
3682	Low	06-Apr-2001	9:51:06 PM	njerniga	Relocated nitrogen purge.
3677	Low	06-Apr-2001	2:45:00 PM	dnewbern	0700-1500 Shutdown
3670	Low	06-Apr-2001	6:44:46 AM	tposs	2300-0700 Shift.
3576	Low	29-Mar-2001	6:20:55 AM	rmccain	0630 hrs Player & Co in
3663	Low	05-Apr-2001	10:36:58 PM	njerniga	Nitrogen
3552	Low	27-Mar-2001	6:02:41 AM	njerniga	Nitrogen and water bleeds on, 29 degrees.
3538	Low	26-Mar-2001	5:57:23 AM	njerniga	Pant and equipment ok.
3659	Low	05-Apr-2001	2:00:00 PM	dnewbern	0700-1500 Shutdown
3526	Low	24-Mar-2001	9:16:03 AM	njerniga	No contractors today.
3463	Low	19-Mar-2001	8:02:08 AM	rmccain	U V System in by-pass 0700hrs
3449	Low	18-Mar-2001	6:24:37 AM	njerniga	Plant ok.
3445	Low	17-Mar-2001	4:46:42 PM	tposs	OPERATIONS
3435	Low	16-Mar-2001	10:15:29 PM	rmccain	Operations
3653	Low	05-Apr-2001	6:10:53 AM	tposs	2300-0700 Shift.
3651	Low	04-Apr-2001	10:50:34 PM	njerniga	UV to normal.
3648	Low	04-Apr-2001	2:15:00 PM	dnewbern	0700-1500 Shutdown
3429	Low	16-Mar-2001	6:09:51 AM	njerniga	Plant security and equipment ok.
3423	Low	15-Mar-2001	2:52:39 PM	rmccain	Fire water system
3421	Low	15-Mar-2001	10:38:50 AM	mmayhue	Operations
3419	Low	15-Mar-2001	6:23:55 AM	njerniga	Heavy rain on and off.
3416	Low	14-Mar-2001	10:51:30 PM	rmccain	UV system in normal at 1800
3411	Low	14-Mar-2001	11:19:47 AM	mmayhue	Operations
3399	Low	13-Mar-2001	10:35:06 AM	njerniga	Mastec Electrical on site.
3409	Low	14-Mar-2001	7:51:21 AM	tposs	OPERATIONS
3402	Low	13-Mar-2001	5:42:57 PM	rmccain	UV system in normal 1730
3397	Low	13-Mar-2001	8:21:58 AM	njerniga	0700-UV to bypass.
3396	Low	13-Mar-2001	6:45:37 AM	tposs	OPERATIONS

Liquefaction and Sendout Dates
Started LNG vaporization send-out on July 5, 2000.
Secured LNG vaporization send-out on July 30, 2000.
Started LNG vaporization send-out on August 1, 2000.
Secured LNG vaporization send-out on August 4, 2000.
Vaporization send out for the past six months was as follow:
July 2000: 242,928 Mcf of LNG
August 2000: 145,731 Mcf of LNG
December 2000: 62,100 Mcf of LNG

Started LNG liquefaction process on September 1, 2000.
Secured LNG liquefaction process on October 14, 2000.
Started LNG liquefaction process on October 16, 2000.
Secured LNG liquefaction process on October 23, 2000.

Liquefaction for the past six months was as follows:
September 2000: 183,458 Mcf of LNG
October 2000: 266,227 Mcf of LNG

CHATTANOOGA GAS COMPANY LNG PLANT OPERATING SUMMARY SEPT. 2000	INLET PLANT	TOTAL TO ACCOUNT FOR					CHANGE IN LNG TANK LEVEL					
	TOTAL INTO PLANT	TO LIQUE-FACTION	TO TURBINE FUEL	TO VAPORIZER FUEL	REGEN GAS	TOTAL ACCOUNTED FOR	OPENING INVENTORY	FROM LIQUE-FACTION	TO VAPOR-IZATION	TO BOIL-OFF	TO LIQUID SALES	ENDING INVENTORY
26	0	0	0	0	0	0	(30,638)	0	0	501		(31,139)
27	0	0	0	0	0	0	(31,139)	0	0	463		(31,602)
28	0	0	0	0	0	0	(31,602)	0	0	537		(32,139)
29	8,307	0	1,212	0	7,095	8,307	(32,139)	0	0	505		(32,644)
30	11,467	0	1,445	0	10,022	11,467	(32,644)	0	0	537		(33,181)
31	11,214	0	3,537	0	7,677	11,214	(33,181)	0	0	668		(33,849)
1	16,161	4,908	5,075	0	6,178	16,161	(33,849)	4,908	0	877		(29,818)
2	15,628	7,788	6,083	0	1,777	15,628	(29,818)	7,788	0	1,339		(23,369)
3	15,497	6,612	3,209	0	5,677	15,497	(23,369)	6,612	0	1,237		(17,994)
4	17,325	8,215	1,822	0	7,288	17,325	(17,994)	8,215	0	1,228		(11,007)
5	20,560	9,351	2,357	0	8,852	20,560	(11,007)	9,351	0	1,289		(2,946)
6	21,152	8,685	3,884	0	8,583	21,152	(2,946)	8,685	0	1,429		4,310
7	21,881	10,856	2,358	0	8,667	21,881	4,310	10,856	0	1,451		13,715
8	20,918	9,129	3,841	0	7,948	20,918	13,715	9,129	0	1,336		21,508
9	12,414	5,516	2,617	0	4,281	12,414	21,508	5,516	0	948		26,077
10	20,231	9,185	3,404	0	7,642	20,231	26,077	9,185	0	1,123		34,139
11	14,788	6,478	2,180	0	6,131	14,788	34,139	6,478	0	1,103		39,513
12	14,224	3,899	2,217	0	8,108	14,224	39,513	3,899	0	1,212		42,200
13	17,440	4,899	3,306	0	9,235	17,440	42,200	4,899	0	1,406		45,694
14	17,046	5,295	2,682	0	9,069	17,046	45,694	5,295	0	1,284		49,725
15	21,500	9,004	3,609	0	8,887	21,500	49,725	9,004	0	942		57,786
16	14,926	7,310	1,753	0	5,863	14,926	57,786	7,310	0	881		64,236
17	21,357	10,185	2,652	0	8,520	21,357	64,236	10,185	0	1,048		73,373
18	21,292	9,624	2,538	0	9,130	21,292	73,373	9,624	0	1,025		81,972
19	18,980	6,675	3,057	0	9,248	18,980	81,972	6,675	0	763		87,884
20	11,155	5,183	839	0	5,133	11,155	87,884	5,183	0	883		92,183
21	15,353	5,588	2,653	0	7,112	15,353	92,183	5,588	0	751		97,020
22	18,999	8,312	2,372	0	8,315	18,999	97,020	8,312	0	1,056		104,276
23	15,985	6,506	2,954	0	6,525	15,985	104,276	6,506	0	863		109,919
24	15,618	5,215	3,417	0	6,986	15,618	109,919	5,215	0	781		114,353
25	20,013	9,040	1,958	0	9,015	20,013	114,353	9,040	0	1,113		122,281
	471,431	183,458	79,010	0	208,984	471,431		183,458	0	30,539	0	

CHATTANOOGA GAS COMPANY LNG PLANT OPERATING SUMMARY Oct-00	INLET PLANT	TOTAL TO ACCOUNT FOR					CHANGE IN LNG TANK LEVEL					
	TOTAL INTO PLANT	TO LIQUE-FACTION	TO TURBINE FUEL	TO VAPORIZER FUEL	REGEN GAS	TOTAL ACCOUNTED FOR	OPENING INVENTORY	FROM LIQUE-FACTION	TO VAPOR-IZATION	TO BOIL-OFF	TO LIQUID SALES	ENDING INVENTORY
1	18,976	8,990	2,469	0	7,517	18,976	0	8,990	0	1,197		7,793
2	11,918	4,996	1,557	0	5,365	11,918	7,793	4,996	0	965		11,824
3	0	0	0	0	0	0	11,824	0	0	471		11,353
4	0	0	0	0	0	0	11,353	0	0	542		10,811
5	16,670	5,043	3,601	0	8,026	16,670	10,811	5,043	0	743		15,111
6	21,467	9,546	2,752	0	9,169	21,467	15,111	9,546	0	947		23,710
7	22,491	10,254	3,246	0	8,991	22,491	23,710	10,254	0	1,117		32,846
8	23,237	10,090	4,166	0	8,981	23,237	32,846	10,090	0	1,222		41,714
9	21,492	10,586	1,839	0	9,067	21,492	41,714	10,586	0	912		51,388
10	20,374	8,497	2,745	0	9,132	20,374	51,388	8,497	0	973		58,913
11	19,780	6,619	4,230	0	8,931	19,780	58,913	6,619	0	976		64,556
12	20,145	8,881	2,576	0	8,688	20,145	64,556	8,881	0	1,088		72,349
13	20,030	8,275	3,543	0	8,212	20,030	72,349	8,275	0	1,019		79,605
14	6,753	3,382	865	0	2,507	6,753	79,605	3,382	0	963		82,023
15	1,683	658	98	0	927	1,683	82,023	658	0	958		81,723
16	16,948	6,573	2,914	0	7,461	16,948	81,723	6,573	0	930		87,366
17	19,261	7,343	3,410	0	8,508	19,261	87,366	7,343	0	894		93,816
18	21,207	8,969	3,354	0	8,884	21,207	93,816	8,969	0	907		101,877
19	21,572	9,681	2,795	0	9,096	21,572	101,877	9,681	0	1,082		110,477
20	20,910	9,553	2,367	0	8,990	20,910	110,477	9,553	0	954		119,076
21	19,237	8,162	3,092	0	7,983	19,237	119,076	8,162	0	906		126,331
22	20,537	8,330	3,514	0	8,693	20,537	126,331	8,330	0	806		133,856
23	8,298	3,968	858	0	3,472	8,298	133,856	3,968	0	475		137,349
24	0	(14)	14	0	0	0	137,349	(14)	0	255		137,080
25	0	536	(536)	0	0	0	137,080	536	0	536		137,080
26	0	401	(401)	0	0	0	137,080	401	0	535		136,946
27	0	72	(72)	0	0	0	136,946	72	0	206		136,812
28	0	110	(110)	0	0	0	136,812	110	0	379		136,543
29	0	162	(162)	0	0	0	136,543	162	0	431		136,274
30	0	(230)	230	0	0	0	136,274	(230)	0	308		135,737
31	0	(425,660)	425,660	0	0	0	135,737	(425,660)	0	0		(289,924)
									0			
	372,986	(266,227)	480,613	0	158,600	372,986		(266,227)	0	23,697	0	

Attachment C:

Maintenance Performed

10/23/99 – 10/23/00

Abnormal Operating Experiences:

The turbine oil pressure had a slow decline in pressure during the liquefaction run. The pressure dropped from 21 psi. to 18 psi.. We will determine the cause during the off season.

During the liquefaction run a crack developed in the cooling water shell of the water jacket of the LP rotor. The problem was discussed with G.E. and they gave their ok to finish the liquefaction run.

Scheduled Maintenance:

The annual vibration check was preformed on 7-21-99, the second check was not done due to scheduling problem with G.E. The vibrations were up slightly but still within limits.

The overspeed trips were tested on 8-5-99 and all trips were at their proper settings.

The annual infrared scans of the liquefaction electrical equipment was done on 8-9-99. There were three hot spot detected in the switcher , but were corrected by tightening the lugs on the breakers.

The pressure gages and relief valves in the vaporizer section were checked during October. There were nine PSV`s that were sent out for repairs. There was four pressure gages replaced.

All the temperature indicators and transmitters were checked for calibration during October 1999.

The cooling tower was removed during August to prepare for the installation of a new tower. The new tower arrived in September and was installed in November 1999.

An 600 kw Emergency Generator was purchased from Atlanta Gas and delivered to the plant on 8-11-99. The pad was installed in November and the generator set in place. A capacity check was conducted 11-30-99 by operating the Boil-off compressor, two LNG pumps, both heaters, two Glycol pumps, one air compressor and the normal plant electrical load. The generator carried the load with power to spare.

Non-scheduled Maintenance:

The solenoid on KV-08 Orbit valve failed 8-5-99 causing the plant to be shut down. The problem was corrected and the plant restarted.

One tube was plugged in the refrigerant condenser after the liquefaction run. There was a small leak from inside the tube.

Operating Information:

The liquefaction unit was started 7-9-99 on 10 hour notice. The unit operated normally but only at about 80% of design. The reason for the lower rate is the age of our sieve and the CO_2 in the feed gas remaining at 1.1% or higher. The liquid unit was shut down 8-13-99 with a tank level of 90`10.5``. The liquid unit only experienced eight hours of down time during the run.

The vaporizers were operated for eight hours on 12-6-99 at a low rate.

There were two LNG trucks loaded on 11-1,2,3,4-99 and 12-3-99.

All plant personnel attend Fire Training at AGL`S Riverdale plant during October.

The plant was put on Emergency Power at 2130 hours on 12-31-99 in preparation for Y2K.

There were no problems with the changing of the date. The plant was returned to normal power at 0145 hours 1-1-2000.

Plant Modifications:

The old cooling tower was removed and a new tower installed in November.

A second generator was installed in November.

Projects for 2000:

A new camera system has been ordered. It will consist of twelve cameras and VCR recorder that is time and date recorded.

Non-Scheduled Maintenance

6-28-00	Changed out molecular sieve in "A", "B" and "C" dehydrators.
7-25-00	Sonitrol Security Company repaired six plant surveillance security cameras.
8-8-00	Replaced regeneration gas cooler fan motor drive belts.
8-9-00	Removed and replaced direct current powered turbine shell cooling water pump.
8-19-00	The turbine nozzle ring control ram on the General Electric turbine was removed for repairs. The repaired control ram was reinstalled on August 22, 2000.
8-23-00	The oil strainer for the turbine fuel regulator was replaced because of damage.
8-25-00	A new constant control oil pump was installed on the turbine. Damage to pump was caused by pieces of the oil strainer from the turbine fuel regulator.
9-22-00	Reinstalled rebuilt "B" LNG pump.
10-17-00	The turbine shutdown and was restarted. Cause of shutdown could not be determined.
10-24-00	Player and Company Electrical Contractors were on plant site to commence plant damage repairs.
12-24-00	Replaced two twenty-four volt batteries on emergency generator EG-101.

Scheduled Maintenance

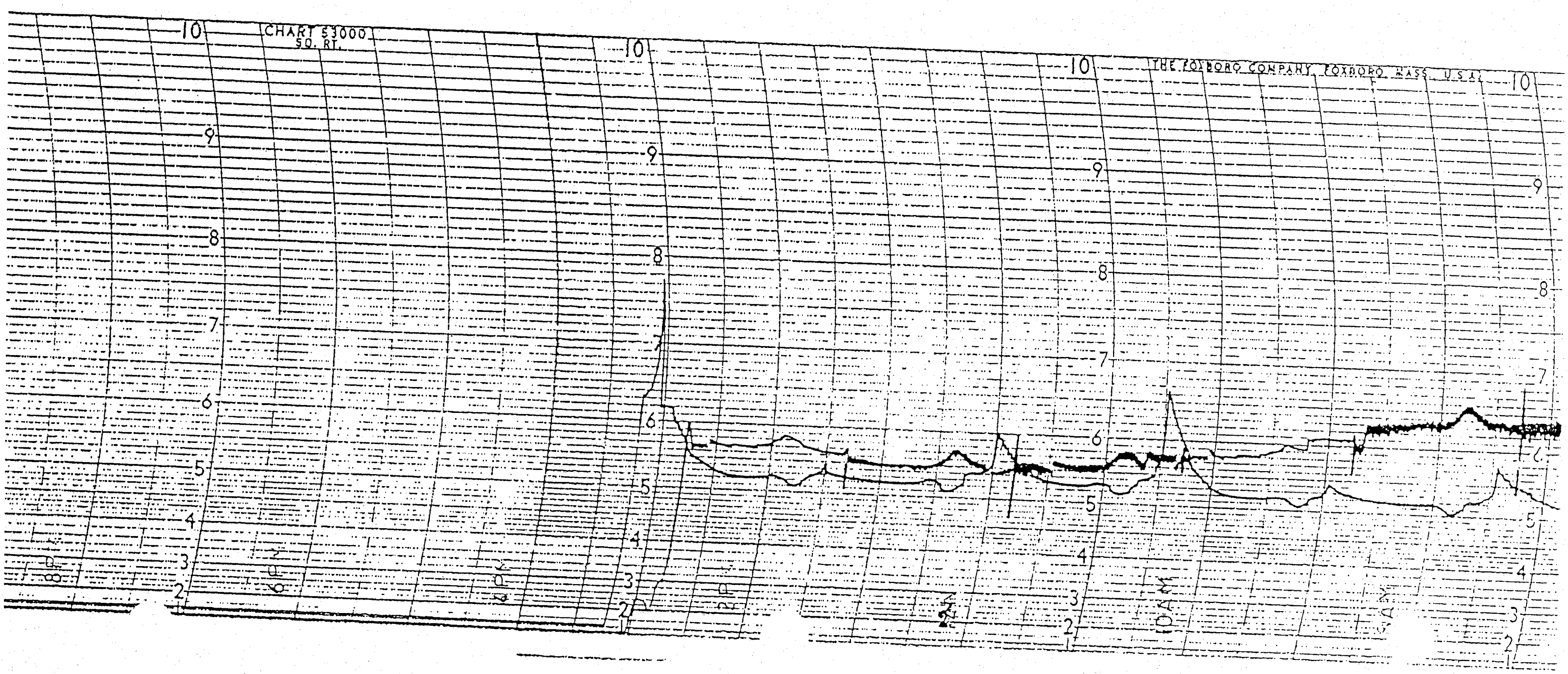
8-8-00	Performed annual inspection and maintenance of all Orbit valves on dehydrator skid.
8-28-00	Performed annual calibration on CO2 analyzer.
10-9-00	Performed semi-annual UV fire detection and gas detection systems testing.
10-10-00	Performed annual testing on residential evacuation alarm.
10-20-00	Performed annual inspection on plant fire extinguishers and fire hose lockers. Maintenance and inspection conducted by outside contractor Chattanooga Fire Protection Inc.
11-1-00	Performed relief valve testing and vaporization gauges on vaporization and LNG tanker station.
11-10-00	Performed semi-annual UV fire detection and gas detection systems test.
12-29-00	Conducted capacities test on emergency generators 101 and 102.

Attachment D:

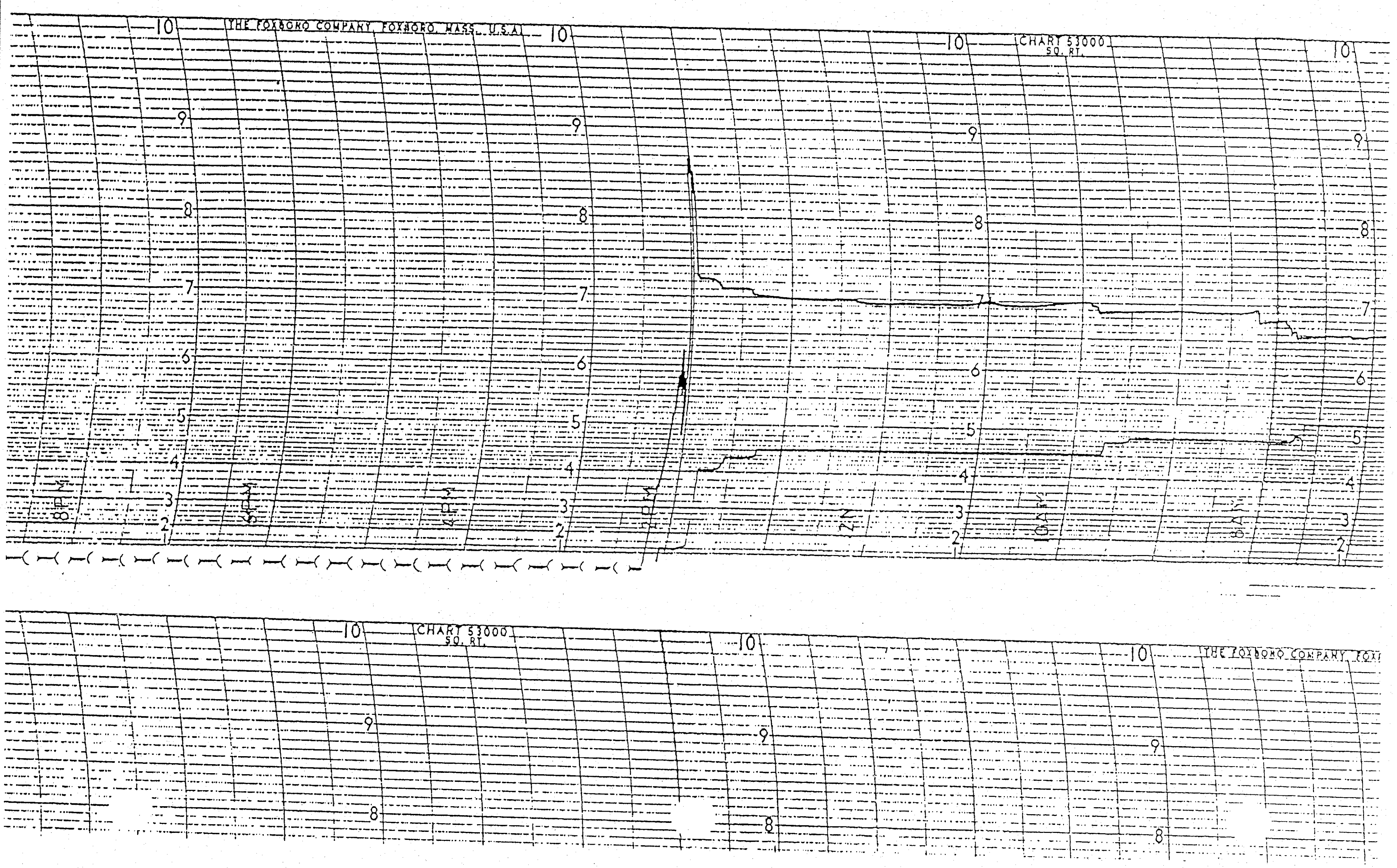
Copies of Charts and Outside Log Readings

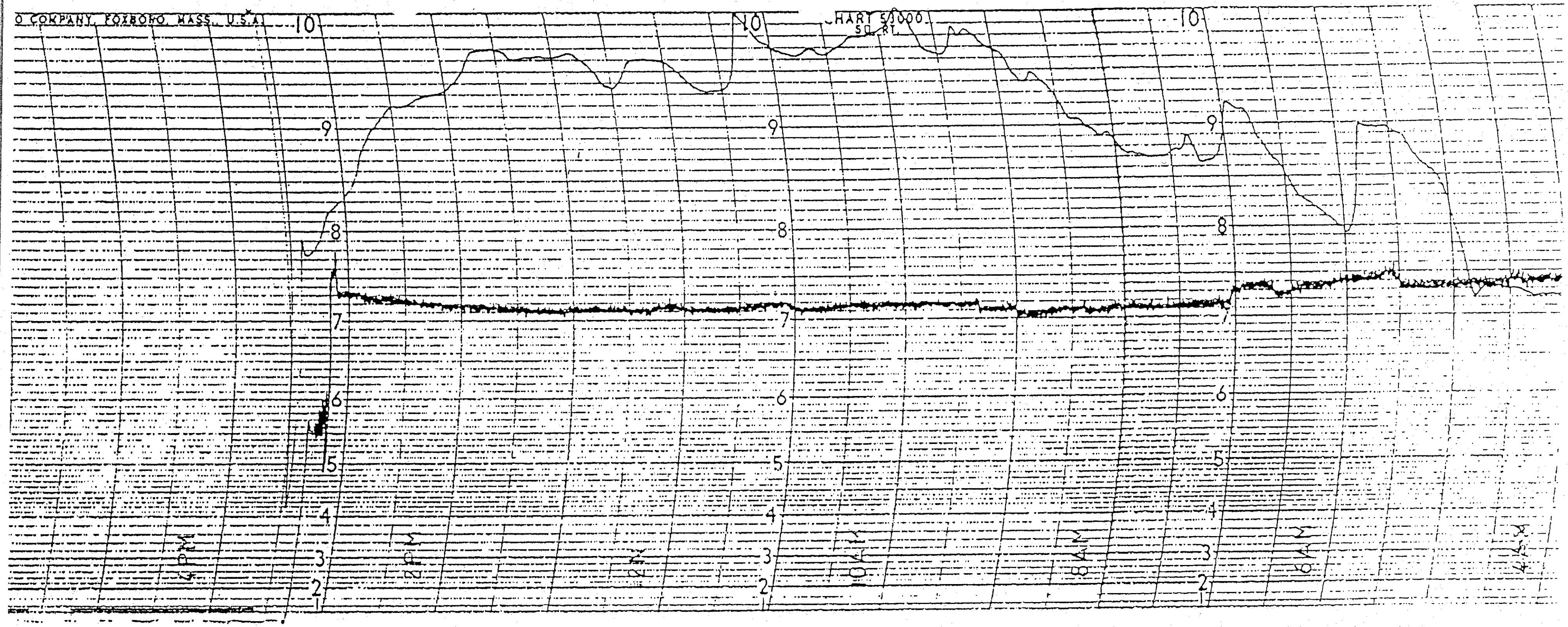
10/23/00

FR-01 – FEED gas
AR-01 – CO_2



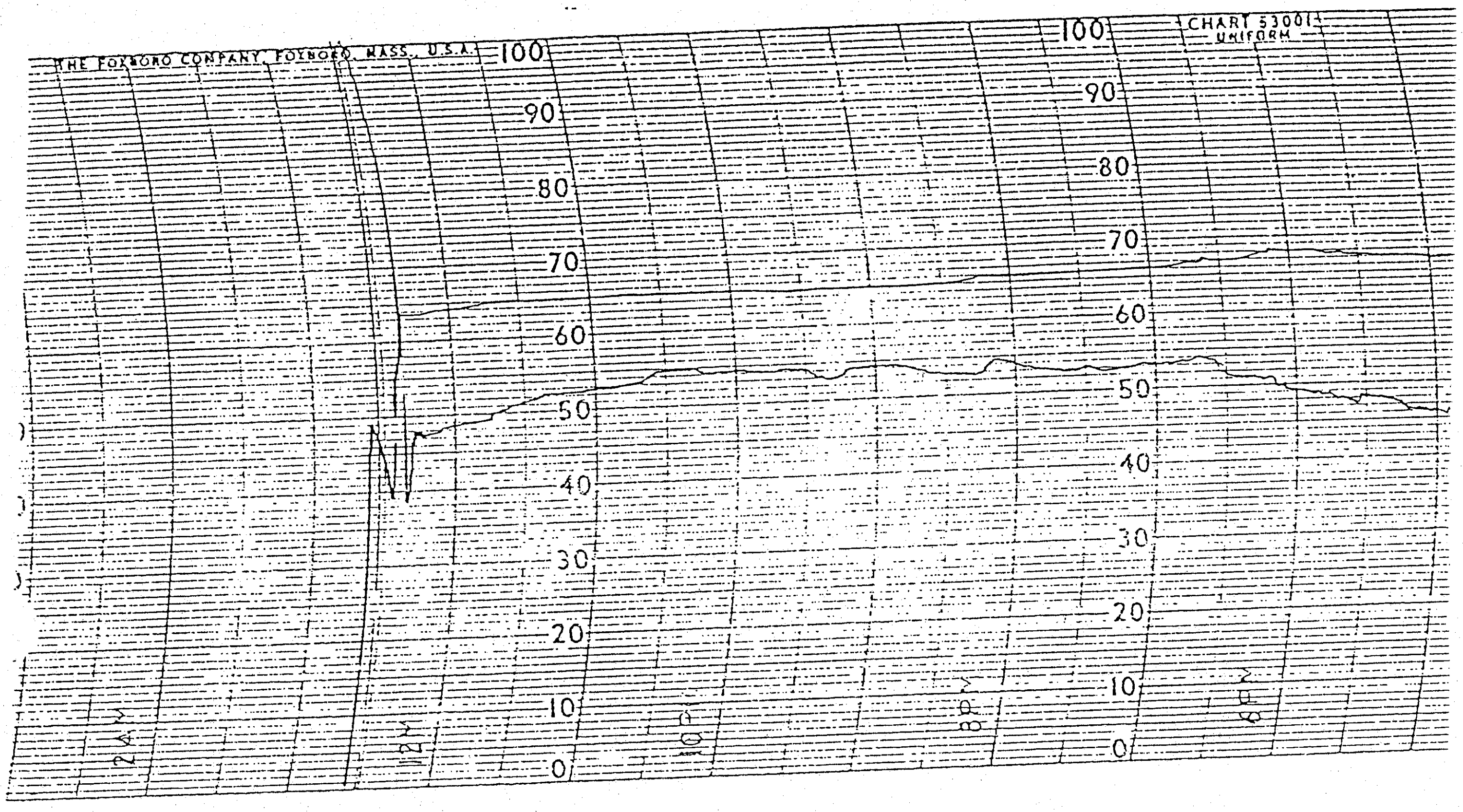
FI-18 LIQUID REFRIGERANT
FI-12 VAPOR REFRIGERANT





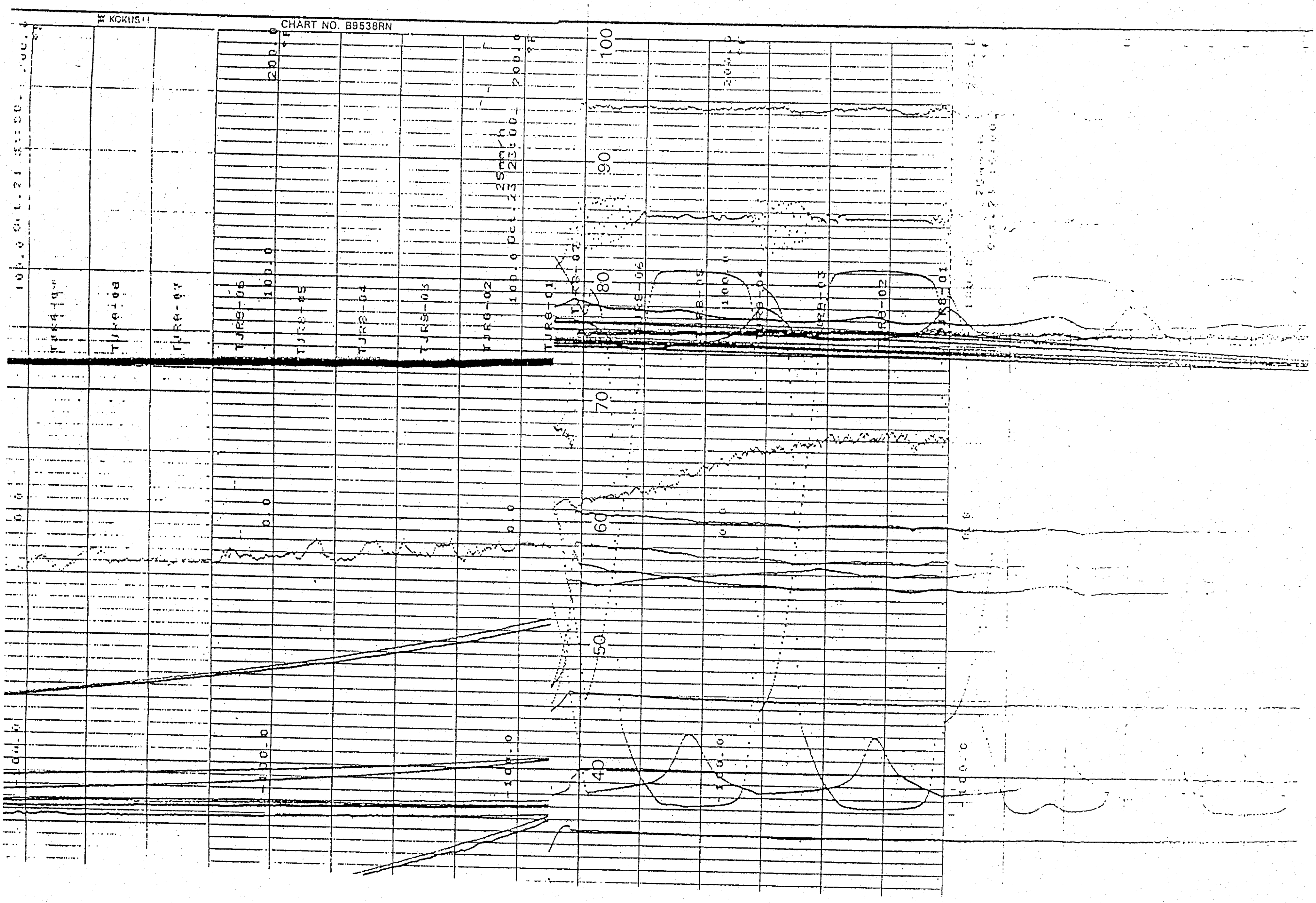
FR-03 — COMPRESSOR DISCHARGE
TR-13 — LNG TEMP

SEPT
23



PR-10 – SUCTION SCRUBBER
PR-11 – DISCHG SEPERATOR

40



2000

200

L N G PLANT
REFRIGERANT COMPRESSOR

DATE		10/22	10/22	10/23	10-23	
TIME		1800	2200	0300	1315	1800
DISCH PRESS	A	258	255	255	273	2??
DISCH TEMP	B	262	258	240	260	260
SUCTION PRESS	C	50	49	44	50	49
SUCTION TEMP 8/14	D	86	80	85	85	83
MAIN OIL PRESS	E	228	230	230	230	230
MAIN OIL TEMP	F	104	100	105	106	103
MAIN OIL PRESS AFT FIL	G	230	230	230	230	230
THRUST PRESS	H	155	155	155	155	155
THRUST TEMP	I	118	118	119	125	120
DRIVE END OIL TEMP	J	130	130	130	131	130
SUMP TEMP	K	140	141	140	146	144
PUMP PRESS	L	56	56	56	58	57
GAS PRESS TO SEALS	M	166	158	160	170	167
BAL PRESS	N	72	73	73	79	77
2nd STAGE SUCT PRESS	O	80	80	80	85	83
3rd STAGE SUCT PRESS	P	130	128	130	135	131
4th STAGE SUCT PRESS	Q	/	/	/	–	/
COMP SPEED	R	5950	6200	6200	6000	5800
VANE POSITION	S	0	0	0	OPEN	0
DISCH FLOW ROOTS FR-03	T	7.4	7.4	7.4	7.2	7.2
COMP OIL LEVEL	U	/	/	/	1/2	/
GEAR BRG TEMP 1	V	176/185	175/183	[illegible]	178/184	177/185
GEAR BRG TEMP 2	W	151/149	150/148	[illegible]/148	157/153	156/154
COMP BRG TEMP 3	X	122/150	120/148	[illegible]	141/153	145/154
GEAR OIL IN TEMP	Y	124	124	124	127	126
GEAR OIL PRESSURE	Z	23	23	23	23	23
Ambient		76	66	61	80	78

2000

GE Turbine

CHATTANOOGA GAS COMPANY – LNG PLANT

DATE		10/22	10/22	10/23	10-23	10/23					
:		1800	2200	0300	1315	1800					
INSTR AIR HDR PRESS	(A)	113	112	112	112	112					
LP TURBINE RPM	(B)	5950	6200	6200	6000	5800					
HP TURBINE RPM	(C)	6700	6800	6800	6800	6700					
OIL SUMP TEMP	(D)	151	153	153	155	154					
LO PRESS PUMP HDR	(E)	58	58	58	58	58					
LO PRESS TURB BRG HRD	(F)	23	23	23	23	23					
CONT AIR SUPPLY PRESS	(G)	Peg	Peg	PEG	?	PEG					
COMP DISC AIR PRESS	(H)	61	62	62	63	62					
GAS FUEL PRESS A/STR	(I)	221	220	220	220	222					
LO PRESS BEFORE FIL	(J)	62	61	61	62	61					
LO PRESS AFTER FIL	(K)	48	48	48	52	50					
CONT AIR MANIF PRESS	(L)	37	37	37	37	37					
FUEL GAS PRESSURE ~~T2 ΔP ACROSS CORE~~	(M)	119	120	120	120	120					
PIC-56 CORE LNG PRESS	(N)	207	204	205	204	202					
PI-51 PRESS TO 'A' JT VALVE	(O)	232	230	230	257	249					
D-110J PRESS	(P)										
REGEN GAS FLOW	(Q)	6.9	7.2	7.5	7.3	7.4					
PI-36 NEW BOX PRESS	(R)	.1	.1	.1	.1	.1					
FI-43, N_2 TO NEW BOX	(S)	.3	.3	.3	.3	.3					
FI-17, N_2 TO OLD BOX	(T)										
FI-07A FEED TO E-102A	(U)	5.3	5.4		?	5.6					
FI-07B FEED TO E-102B	(V)	5.6	5.8		?	5.7					
FI-07C FEED TO E-102C	(W)	5.2	5.4		?	5.3					
PI-4 INLET GAS HDR PRESS	(X)	230	231	230	230	230					
OUTLET GAS HDR ~~BLOW DOWN~~	(Y)	154	142	118	122	121					
J2 REF COND WATER OUT	(Z)	96	92	95	100	99					
TI-07 CW SUPPLY TEMP		68	67	67	70	69					
CW SUPPLY PRESS		52	53	52	53	52					

CHATTANOOGA GAS COMPANY
LNG PLANT

DATE 10-23-00 (Beginning at 1000 Hrs.)

TIME	1100	1300	1500	1700	1900	2100	2300	0100	0300	0500	0700
FR-01, FEED GAS, √	6.3	6.3	5.8	5.5	5.6						
AR-01, CO_2, PPM	14	15	13	13	15						
PR-10, REFR SUCT PRESS	45	49	54	56	49						
PR-11, REFR DISC PRESS	270	275	265	260	260						
FR-03, REFRIG FLOW, √	7.2	7.1	7.1	7.1	7.3						
TR-13, LNG TEMP	-245	-242	-241	-242	-247						
TDR-31, EXh TEMP DIFF											
LI-03, D-104 LEVEL	11	11	13	12	12						
D-105 LEVEL	49	48	46	48	47						
FE-12, VAPOR FLOW, √	6.7	6.6	6.9	6.9	7.1						
-18, LIQUID FLOW, √	5.2	5.2	4.6	4.5	4.3						
PDIC-70, DIFF PRESS											
TJR-05/3 COMP DISCH	265	264	245	249	259						
TJR-05/5 REF COND OUTLET	100	101	98	98	99						
TJR-08/12, LNG FROM E102											
TJR-08/14 REFR TO D104	85	85	82	85	87						
LP TURBINE RPM	6150	6050	5600	5700	6000						
HS-02/5 AVG EXh TEMP	938	941	936	943	939						
INSTR AIR PRESS	112	112	112	112	112						
TJR-11/8	-235	-233	-231	-232	-237						
/9	-245	-244	-240	-241	-246						
/13	-240	-236	-235	-236	-241						
/14	-250	-245	-243	-245	-249						
/22	-238	-235	-234	-235	-241						
/23	-237	-234	-232	-234	-238						
Ambient 8/11	74	82	84	82	77						

Chattanooga LNG Plant
Daily Readings

Date 10-23-00 Time	200	600	1000	1400	1800	2200	Average
B/O Comp							
Gas Flow FR-14	5.2	5.4	6.5	6.6	6.5		
Line Pressure PI-30	55	55	55	58	56		
LNG Tank PR-13	.41	.59	.58	.65	.65		
Comp. Suct. PI-17	1.3	1.3	1.3	1.3	1.3		
Comp. Disc. PI-18	44	65	64	66	65		
Oil Press PI-19	99	99	99	102	101		
Oil Press. PI-40	77	77	79	78	77		
Outlet E-J PI-41	60	60	60	61	60		
Panel Purge			.8				
Comp. Suct. TJR8-23	-16	-22	-34	-21	-22		
Inlet E-1 TI-09	136	135	135	143	140		
Outlet E-1 TI-11	55	53	37	55	50		
Oil Temp. TC-26	119	114	116	128	122		
Motor Amps	200	260	230	225	220		
N2 Purge			.3				
Battery Charger Volts	130	130	130	130	130		
Battery Charger Amps	.3	.3	.3	3.3	3.3		

LNG Level LI-06			32-10 1/4				
% Level LI-05			34-		34		

Tank Heater ON	✓	✓	✓	✓	✓		
TIC-14 F.	40	40	40	40	40		
N2 Inventory							
Operators Initial	TP	TP	NJ	Rrpm	P		

1000 Readings for GC DOR 5,105,415

LNG gals from LI-06 5,129,425

MMCF of LNG 423,779.3

Boil Off Meter Reading 193?3?

FEED — 20537

TA — 8693

S.O. — 803

WATER 366580

CHATTANOOGA FIRE DEPARTMENT
Pre-Fire Plan Update Inspection Form

1. Company Inspecting E10 2. Premise #

3. Business Name: CHATTANOOGA GAS (L.N.G.)

4. Address: 3401 N. HAWTHORNE

5. Date Inspected	6. Shift	7. Officer Inspecting	8. Comments
6-20	GREEN	CAPT. ADAMS	
			Responsible: CHRIS YOUNG
			(423) 554-4188
			ALSO List For Emergency
			Attached,
			"See Pre Plan"

1. Company Inspecting (PRINT)
2. Premise # LEAVE BLANK (FPB will assign)
3. Business or Building Name (PRINT)
4. Correct Address (PRINT)
5. Date of Inspection
6. Shift Inspecting
7. Officer Inspecting Business
8. Comments Required — If no change — indicate "NO CHANGES" (If changes to the bldg. have been made, Example: Owner, Structure, Business Name, Responding Company, etc. send in the Pre-Plan with this Form so a new copy of the building can be distributed to all responding companies.

PRE-PLANNING INSPECTION

Chattanooga Gas (L.N.G Plant)
Building being inspected (Give Name)

Chattanooga Gas CO
Name of Owner, Occupant, Lessee, Tenant

105 N. Hawthorne St — 624-4843
Address — Phone

PLANT SUPERVISOR
Name or Responsible party who can be reached at night

CHRIS YOUNG (423) 554-4188
Address — Phone

DATE 10-20-98

(Circle) Copy for; Company Battalion Bureau

Inspector Capt. Capdies E10

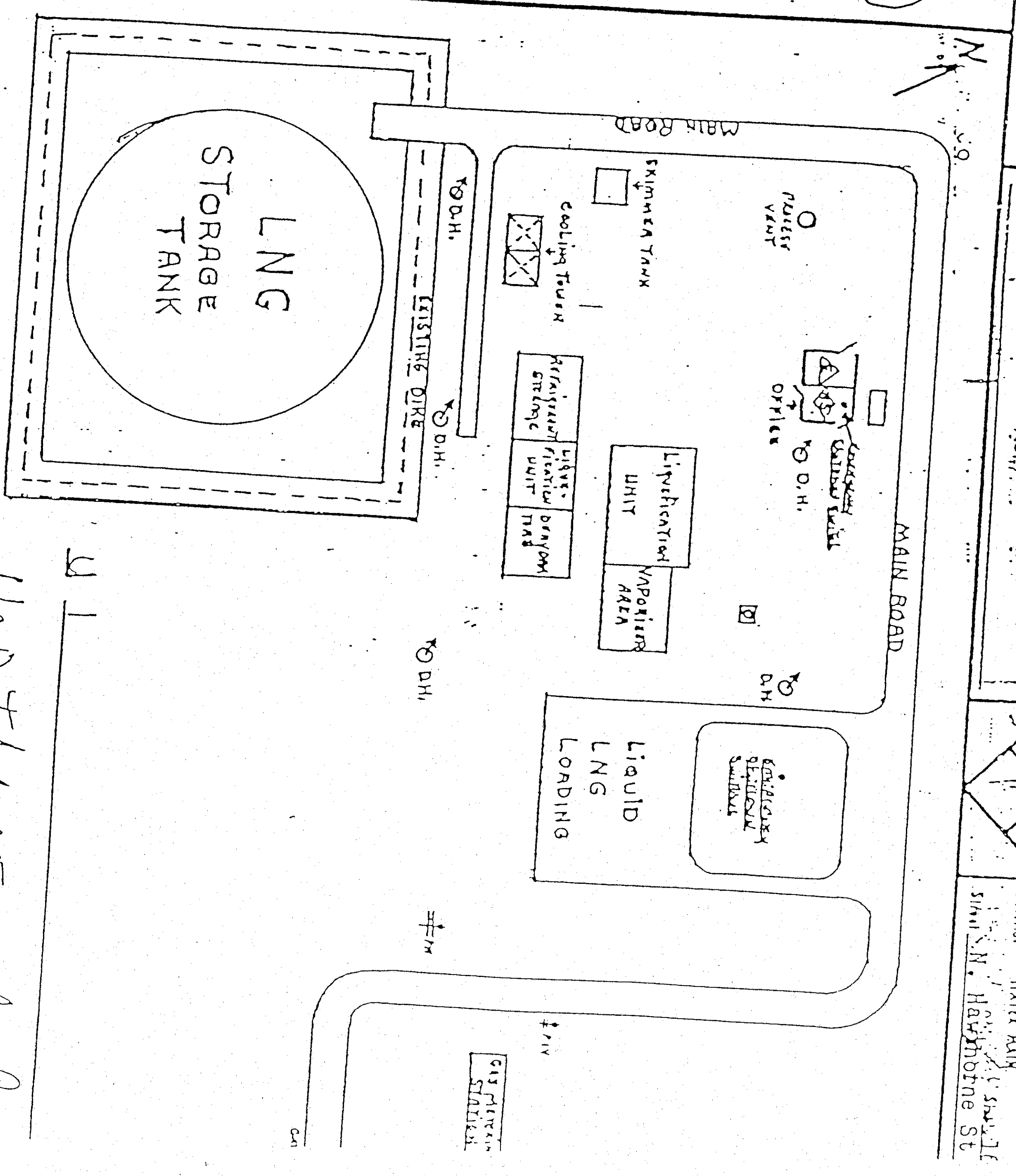
Company	Platoon	Battalion	Division
10 Engine Co	RED	II	

Make one diagram for the complex and one diagram for each fire area or building.

This is page I of a set of I pages.

SHOW ON EVERY DIAGRAM

1. Arrow North 2. Street and Number 3. Height 4. Fire Walls 5. Stairs and Fire Escapes 6. Doors 7. Vertical Openings 8. Scale: 1" (10', 20' 50' 100')



N. Hawthorne St 3500
Street Name and Address

Chattanooga Gas Co
Name of Company or Occupancy

to million gal storage tank of liquid natural gas

RESPONDING COMPANIES: Initial 10 ... Truck 2, 3, 5
Arterial WATER MAIN
Street N. Hawthorne St

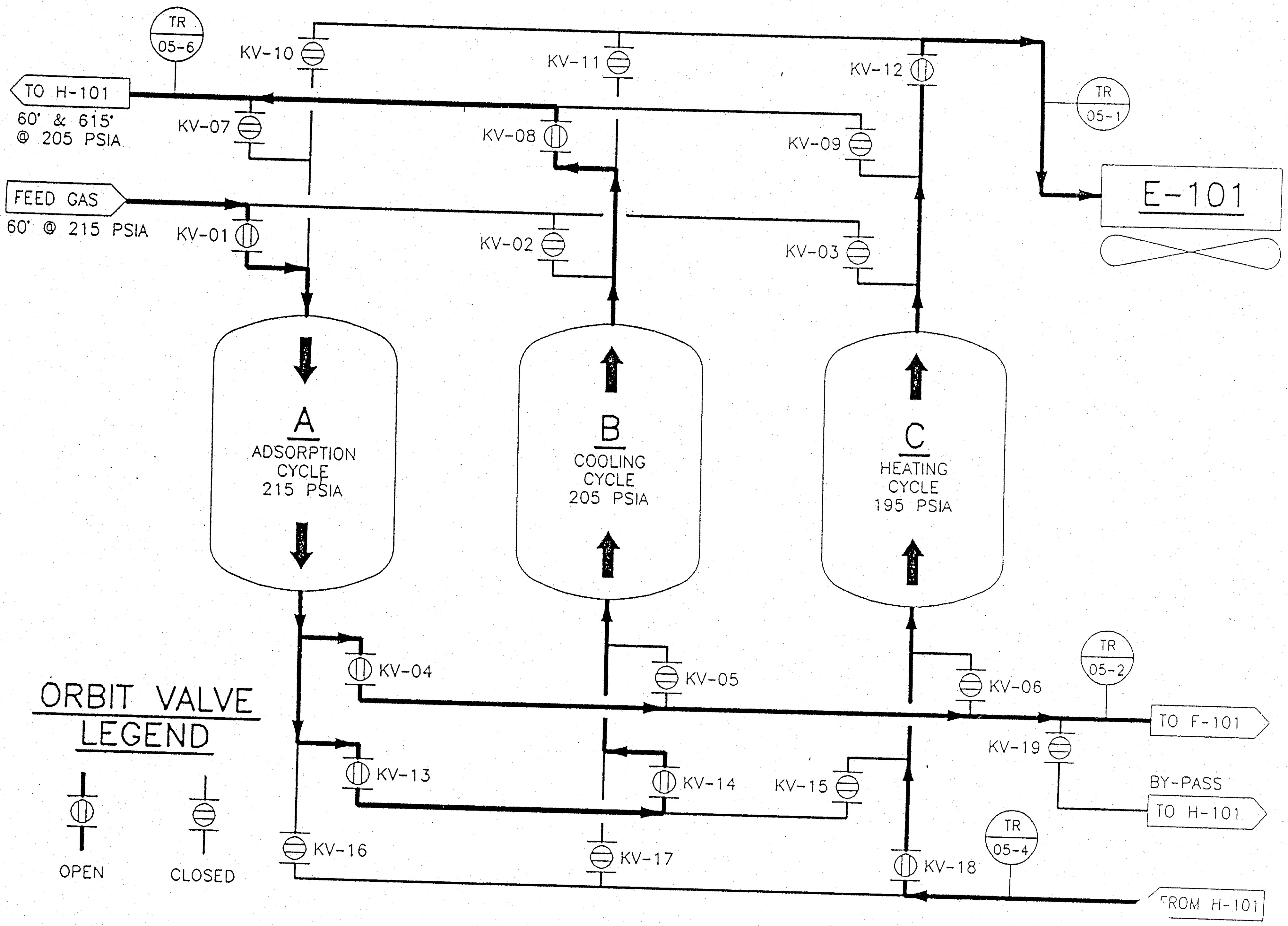
J.B. [illegible] Company Officer

Up Dated 6-25-99 J.B. [illegible]

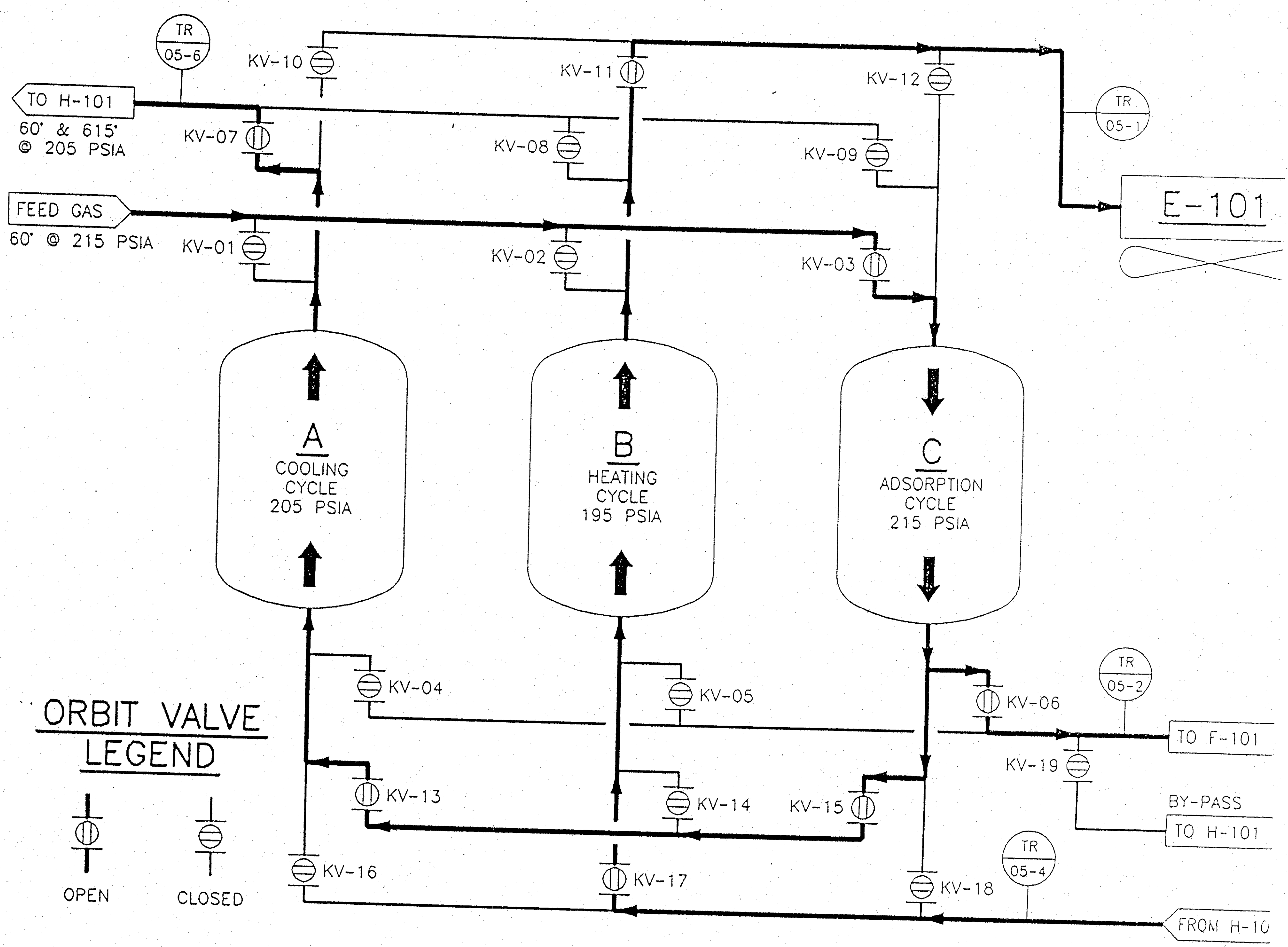
DISTRICT CHIEF

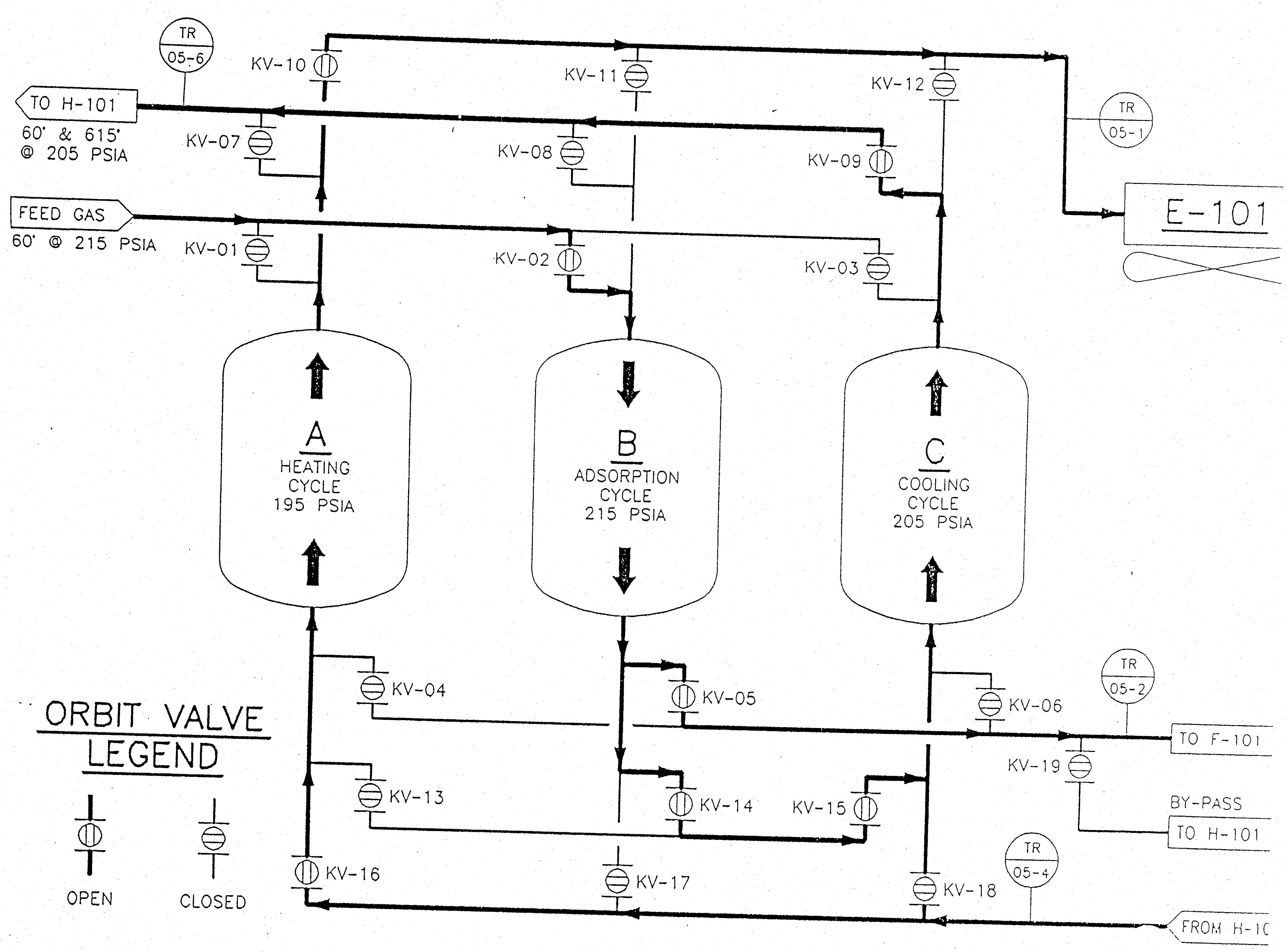
Attachment G:

Orbit Valve Sequence for Dehydrators



TR 05-6
KV-10
KV-11
KV-12
TR 05-1
TO H-101
60' & 615' @ 205 PSIA
KV-07
KV-08
KV-09
E-101
FEED GAS
60' @ 215 PSIA
KV-01
KV-02
KV-03
A
ADSORPTION CYCLE 215 PSIA
B
COOLING CYCLE 205 PSIA
C
HEATING CYCLE 195 PSIA
KV-04
KV-05
KV-06
TR 05-2
TO F-101
ORBIT VALVE LEGEND
KV-13
KV-14
KV-15
KV-19
BY-PASS
TO H-101
OPEN
CLOSED
KV-16
KV-17
KV-18
TR 05-4
FROM H-101


TR 05-6
KV-10
KV-11
KV-12
TR 05-1
TO H-101
60' & 615'
@ 205 PSIA
KV-07
KV-08
KV-09
E-101
FEED GAS
60' @ 215 PSIA
KV-01
KV-02
KV-03
A
COOLING
CYCLE
205 PSIA
B
HEATING
CYCLE
195 PSIA
C
ADSORPTION
CYCLE
215 PSIA
KV-04
KV-05
KV-06
TR 05-2
TO F-101
ORBIT VALVE
LEGEND
KV-13
KV-14
KV-15
KV-19
BY-PASS
TO H-101
OPEN
CLOSED
KV-16
KV-17
KV-18
TR 05-4
FROM H-10


TR 05-6
KV-10
KV-11
KV-12
TO H-101
60° & 615°
@ 205 PSIA
KV-07
KV-08
KV-09
TR 05-1
FEED GAS
60° @ 215 PSIA
KV-01
KV-02
KV-03
E-101
A
HEATING
CYCLE
195 PSIA
B
ADSORPTION
CYCLE
215 PSIA
C
COOLING
CYCLE
205 PSIA
KV-04
KV-05
KV-06
TR 05-2
TO F-101
KV-13
KV-14
KV-15
KV-19
BY-PASS
TO H-101
KV-16
KV-17
KV-18
TR 05-4
FROM H-1C
ORBIT VALVE
LEGEND
OPEN
CLOSED

FILE IB-17

Chattanooga LNG Facility
Orbit Valve sequence for Adsorbers

May 2 1998

STEP	ACTION	KV-01	KV-02	KV-03	KV-04	KV-05	KV-06	KV-07	KV-08	KV-09	KV-10	KV-11	KV-12	KV-13	KV-14	KV-15	KV-16	KV-17	KV-18	KV-19	NUMBER of VALVES OPEN this STEP	OPEN VALVE	CLOSE VALVE
1	Open Bypass	0	0	1	0	0	1	1	0	0	0	1	0	1	0	1	0	1	0	1	8	KV-19	
2	A" off cooling	0	0	1	0	0	1	0	0	0	0	1	0	1	0	0	0	1	0	1	6		KV-07&KV-15
3	A" on Adsorb	1	0	1	1	0	1	0	0	0	0	1	0	1	0	0	0	1	0	1	8	KV-01&KV-04	
4	C" off Adsorb	1	0	0	1	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1	6		KV-03&KV06
5	C"on Heating	1	0	0	1	0	0	0	0	0	0	1	1	1	0	0	0	1	1	1	8	KV-12&KV-18	
6	B" off Heating	1	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	6		KV-11&KV-17
7	B" on Cooling	1	0	0	1	0	0	0	1	0	0	0	1	1	1	0	0	0	1	1	8	KV-08&KV-14	
8	Close Bypass	1	0	0	1	0	0	0	1	0	0	0	1	1	1	0	0	0	1	0	7		KV-19
9.	Extended Time	1	0	0	1	0	0	0	1	0.	0	0	1	1	1	0	0	0	1	0	7		
10	Open Bypass	1	0	0	1	0	0	0	1	0	0	0	1	1	1	0	0	0	1	1	8	KV-19	
11	"B" off cooling	1	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	1	1	6		KV-08&KV-13
12	"B" on Adsorb	1	1	0	1	1	0	0	0	0	0	0	1	0	1	0	0	0	1	1	8	KV-02&KV-05	
13	"A" off Adsorb	0	1	0	0	1	0	0	0	0	0	0	1	0	1	0	0	0	1	1	6		KV-01&KV-04
14	"A"on Heating	0	1	0	0	1	0	0	0	0	1	0	1	0	1	0	1	0	1	1	8	KV-10&KV-16	
15	"C" off Heating	0	1	0	0	1	0	0	0	0	1	0	0	0	1	0	1	0	0	1	6		KV-12&KV-18
16	"C" on Cooling	0	1	0	0	1	0	0	0	1	1	0	0	0	1	1	1	0	0	1	8	KV-09&KV-15	
17	Close Bypass	0	1	0	0	1	0	0	0	1	1	0	0	0	1	1	1	0	0	0	7		KV-19
18	Extended Time	0	1	0	0	1	0	0	0	1	1	0	0	0	1	1	1	0	0	0	7		
19	Open Bypass	0	1	0	0	1	0	0	0	1	1	0	0	0	1	1	1	0	0	1	8	KV-19	
20	"C" off cooling	0	1	0	0	1	0	0	0	0	1	0	0	0	0	1	1	0	0	1	6		KV-09&KV-14
21	"C" on Adsorb	0	1	1	0	1	1	0	0	0	1	0	0	0	0	1	1	0	0	1	8	KV-03&KV-06	
22	"B" off Adsorb	0	0	1	0	0	1	0	0	0	1	0	0	0	0	1	1	0	0	1	6		KV-02&KV-05
23	"B"on Heating	0	0	1	0	0	1	0	0	0	1	1	0	0	0	1	1	1	0	1	8	KV-11&KV-17	
24	"A" off Heating	0	0	1	0	0	1	0	0	0	0	1	0	0	0	1	0	1	0	1	6		KV-10&KV-16
25	"A" on Cooling	0	0	1	0	0	1	1	0	0	0	1	0	1	0	1	0	1	0	1	8	KV-07&KV-13	
26	Close Bypass	0	0	1	0	0	1	1	0	0	0	1	0	1	0	1	0	1	0	0	7		KV-19
27	Extended Time	0	0	1	0	0	1	1	0	0	0	1	0	1	0	1	0	1	0	0	7		

NOTE: Valve OPEN = 1

Valve Closed = 0

1. INTRODUCTION

This operating manual contains a description and instructions for the start-up and operation of the facilities. Where specific operating ıditions are specified, they must be adhered to. Actual operating experience will, of course, develop the most efficient and practical method: rt-up and operation of these facilities.

A. After all construction is essentially completed, a visual inspection of all vessels and equipment that have open manways should be grease, insulation, or other solid material.

B. All specified leak and proof tests shall have been satisfactorily completed. All valving, reliefs, attachments, and instrumentation shc npleted. One person should be named to make up a detailed work plan and schedules. All valves and equipment used in this operation shou rect position and tagged for purge and leak test.

No operating manual can cover all the circumstances which may arise during the operation of a process plant. The manual is written f experienced operators familiar with good operating practices in process plants. Operators are expected to completely familiarize themselves contents of this manual as well as the safe operating limits of each item in the plant.

2. PROCESS DESIGN BASIS AND DESCRIPTION

General Description

The Liquefied Natural Gas (LNG) liquefaction and vaporization facility described herein covers a facility for treating, liquefying, storing, ck load-out, and revaporization of natural gas. The plant will liquefy pipeline gas during periods of low gas demand which will then be stored ,000 barrel (1,200 MM SCF) above-ground, double-walled, insulated LNG tank. The liquefied gas will be stored at a temperature of minus 2 l a pressure of 0.5 PSIG. The stored liquid will provide a source of gas to meet winter peak shaving demands through revaporization of gas eline or use of satellite storage tanks located at larger user's plants to provide uninterrupted service. This type of plant is classified in the LN ustry as a "Peak Shaving Facility."

The liquefaction portion of the plant is designed to liquefy gas at a net rate of approximately 10 MM SCFD. The net rate means that th liquefy pipeline gas at a sufficient rate so that the daily accumulation in the tank after tank boil-off and the effect of high daytime temperat iipment operation efficiency will be equivalent to 10 MM SCFD. To achieve the net rate, the plant liquefaction rate will vary from about 9 MM ing peak daytime temperatures to about 11 MM SCFD during cool nighttime temperatures. Boil-off from the LNG storage tank, which is a re it penetration into the tank, will be at a rate of 1,064,000 SCFD during liquefaction periods, and approximately 600,000 SCFD during non- iefaction periods. The boil-off rate for liquefaction periods includes flash gas, natural gas which did not completely liquefy, from the liquefact ility. The LNG tank boil-off gas is recompressed and returned to the main pipeline. The liquefaction facility will be operated for approximatel 's each year with liquefaction scheduled to begin in May of each year. The liquefaction facility, at its rated capacity, will fill the tank in appro:) days. The additional production will be distributed to satellite storage tanks.

The vaporization facility is designed to revaporize LNG for delivery to the pipeline during periods of peak demand at rates up to a maxi SCFD. This is achieved by three (3) 30 MM SCFD vaporizers, each having a turndown of 6 MM SCFD or a total turndown 10 to 1 for the iorization facility. Odorization of send-out gas is not included in these facilities, but provided for in the Chattanooga Gas Company's installed his plant.

In addition to revaporization, the facility has been designed to simultaneously load-out LNG tank trucks. LNG tank trucks will be rated 000-gallon capacity. It will take approximately 30 minutes to load a truck.

The above-described facilities are depicted on the following simplified flow diagram. The appendix section of this manual contains deta ns, process, and mechanical flow diagrams which indicate the plant lay-out and all the main process streams complete with operating flows, ıperatures, and pressures.

Spacing of the gas treating, liquefaction, storage, vaporization, and LNG truck load-out areas of the plant have been based on 1967 is: ᴾA Number 70. Arrangement of equipment and systems were based on operation requirements, as well as necessary access for maintenance ety.

With reference to drawings in the appendix section of this manual, a description of the process, plant systems, equipment, and functio nmarized in the following paragraphs.

LNG Production Facilities

.1 Inlet and outlet Gas Header System

Natural gas enters and leaves the plant boundary in 8" and 12" gas lines as shown on Mechanical Flowsheet A1-20 and Piping drawing

The inlet separator and inlet and outlet metering and odorizing facilities, which will accept and deliver gas to the pipeline, are not furni contract. These facilities will be within the plant fence line, but will be furnished and installed by Chattanooga Gas Company.

During operation of the liquefaction facilities, gas will be brought into the plant in a 12" buried line at a pressure ranging from210 PSI(G. At the battery limit, the inlet gas line will be reduced to an 8" line and tagged SG-2009-204A. Inside the boundary limit, this line rises at und and is carried on sleeper to provide feed and fuel gas to the following services at the indicated flow rates:

	Flow Rate
Gas Treating Area	18,332 M SCFD
Turbine C-101 Fuel	2,300 M SCFD
Turbine Starting Motor- (start-up only)	
Fuel Gas Start-up Bypass	
Pad Gas to LNG Tank	

.iquefaction Period Regeneration Gas | 8,319 M SCFD
Tank Holding Period | 600 M SCFD
/aporization | 6,600 M SCFD

!l Gas Service

-ument Gas Header
: to Vent Header
.NG Tank Pad Gas
Flame Front Generator
Emergency Generator and Control Building
'aporizer H-102A and B

Manual block and blowdown valves for the plant will be furnished and installed in Chattanooga Gas piping.

.2 Feed Gas Preparation

Water and carbon dioxide (CO_2) must be removed from the feed gas prior to liquefaction to prevent freezing or fouling of the feed gas iefaction section of exchangers located in the cold box. This feed gas preparation or treating will be achieved by three (3) dry desiccant bed iydrators, D-102A, B, and C, which will use molecular sieve beds for dehydration. The Feed Gas Preparation unit is designed to treat feed gε ɜams having a maximum inlet -composition, measured on a volume basis, of 1% CO_2 and 7 pounds/MM SCFD of water with removal to a mε 50 PPM of CO_2 and 1 PPM of water. The feed gas preparation section of the facility consists of dehydration and regeneration equipment, as sl cess and Mechanical Flowsheets A1-1DA and A1-11 and 12 in the Appendix section, and listed below:

.02A, B, C	Dehydrators
01	Regeneration Gas Cooler
01	Filter Separator
.01	Regeneration Gas Heater

As shown on Mechanical Flowsheet A1-11, inlet feed gas will flow to dehydrators D-102A, B, and C through 8"P-2001-204A. The three iydrators are arranged to provide continuous cyclic treatment of the inlet gas for removal of CO and water vapor by having dehydrator abso le the other two dehydrators are regenerating. This is done by means of an automatic time cycle controller and switching valves KV-01 thro The dehydrators will operate on a 6-hour cycle in which each dehydrator will alternately adsorb with a downward flow for a period of two (2 owed by a two (2) hour upward high temperature flow and a two (2) hour upward cooling flow. The dehydrator on adsorption will treat inlet : at a rate of 8,332 M SCFD, of which 11,069 M SCF will be treated feed gas for liquefaction and the remainder of 7,069 M SCFD for cooling ε nperature regeneration of the dehydrator molecular sieve beds. Treated gas, allocated for regeneration, flows first to the dehydrator that is t iled. Regenerator gas leaving the dehydrator being cooled is directed by, means of switching valves to the regeneration gas heater H-101, w gas temperature is raised to 600°F for use in desorbing the dehydrator bed on regeneration. Regeneration gas from the desiccant bed being lows to the Regeneration Gas Cooler & E-101, where the gas is air cooled before flowing to the outlet header and into the pipeline.

The treated feed gas from dehydrator is passed through Feed Gas Filter F-101 to remove dust particles which would plug the brazed minum heat exchanger passages In the liquefaction section.

. 3 Liquefaction

Liquefaction of treated feed gas is accomplished by utilizing what is classified as the "Mixed Refrigerant Cycle". As the name implies, tt igerant is a mixture of components ranging from nitrogen to iso-pentane. The mixture has advantage of minimizing power requirements wh npared to systems having only one refrigerant component. The composition of the refrigerant can vary somewhat without reducing .the oper ciency. The refrigerant composition is easily maintained throughout all operating conditions because the entire system is designed for minim kage. The system is designed so that no major refrigerant loss is experienced during plant shutdown or startup.

The principal advantages of the mixed refrigerant system is the use of a single centrifugal compressor, one heat exchanger to condens d gas, and the elimination of any extraneous refrigerant vessels. The brazed aluminum exchangers used to condense the feed gas provide a cient system that minimizes fluid distribution problems by keeping process streams in a continuous passage during the exchange of heat. Th iefaction system to be described here inherently employs the minimum equipment items to do the job thus aiding in process control and pro -eased reliability and simplified maintenance at lower costs.

3 Liquefaction

.1 Feed Gas Liquefaction

The treated feed gas, after treatment in the feed gas preparation section for removal of CO_2 and water, flows to the cold box where the idensed in Refrigerant Exchanger E-102, K-A, B & C, operating in parallel, by counter current exchange with the mixed refrigerant. Refer to f l Mechanical Flowsheets A1-1OB, and A1-13 in the "Appendix" section for process and mechanical details.

Treated feed gas enters Refrigerant Exchanger E-102 K-A, B & C at a pressure of 205 psia and a temperature of 60°F., and leaves as L ssure of 195 psia and a temperature of -253 °F. The LNG liquid on leaving the exchanger is allowed to expand across the back pressure valve l on to the LNG storage tank ST-105 where the LNG finally expands to a pressure of 15 psia and a temperature of -263 °F. As the LNG expan storage tank, there will be some flashing which will amount to approximately 600 MSCFD. The resulting liquid LNG flow to the tank will be 1 ? ed at 14.7 psia and 60 °F.

.2 Refrigerant System

The refrigerant system produces the required refrigeration by com- pressing the mixed refrigerant to a pressure level which will produc ired cooling by expansion and vaporization in a brazed aluminum exchanger, where the cooled mixed refrigerant is also cross exchanged to treated feed gas stream. The refrigerant section of the liquefaction facilities consists of equipment as shown on Process and Mechanical Flov -1OB and A1-12 and 13 in the "Appendix" section as listed below:

ıtion scrubber. This hot gas re-vaporization is controlled by a level controller LC-03 sensing and controlling liquid which may collect in the sı ubber boot. The four (4) stage refrigerant compressor C-101C compresses the LP refrigerant gas to a discharge pressure of 300 psia and ɪperature of 265 °F.

The refrigerant gas compressor's operation contains all the necessary controls to provide maximum operating efficiency during all loac ıditions and feed gas variations. Refrigerant is automatically bypassed by flow controller FRC-03 to prevent compressor surging during low f ...ons. The system is fully protected by shutdown devices which are described under the plant instrumentation section of the manual.

High pressure (HP) refrigerant gas flows from the compressor to the refrigerant condenser E-103, where the HP refrigeration gas is cc shell side of the refrigerant condenser to 90 °F. with water. Partial condensation of the mixed HP refrigerant exiting temperature is allowed h the cooling water temperature which from day to night operation can produce refrigerant temperatures as low as 70 °F. in the summer an spring and fall operations. These lower exiting refrigerant temperatures along with increased HP of the turbine will provide additional feed gε ıefaction. The partially condensed HP refrigerant mixture from the, condenser, approximately 85% vapor and 15% liquid on a gas volume bε vs to the Refrigerant Discharge Separator, D-105. The vapor and liquid are separated and flow through separate lines to the Refrigerant Exc 03 which is housed on a cold box. E-102 liquid refrigerant is flow controlled from the separator D-105 to the refrigerant controlled exchang h pressure liquid is pumped from D-105 to the cores of E-102's on flow control FV-18 for correct liquid and gas ratio control by pump P-104 s pump cannot be run unless it is flooded with liquid and the 2" minimum flow line back to D-105 should always be in the open position.

HP refrigerant vapor at the refrigerant exchanger E-102 manifold is divided to flow into three (3) refrigerant cases E-102 K-A, B & C o ɔarallel. The combined HP refrigerant mixture is sub-cooled to a liquid stream in the brazed aluminum exchanger to a temperature of -253 °F ı-cooled HP refrigerant liquid from each core is expanded through control valves FV-101 A, B & C to a pressure of 70 psia and a temperature The combined vapor and liquid refrigerant streams (LPR) flow to exchanger cases where they are again mixed for counter current exchange ɔorization to provide necessary cooling to liquefy the treated feed gas stream and the HP mixed refrigerant streams. The vaporized LP refrige vs from the refrigerant exchanger back to the refrigerant suction scrubber D-104 at a pressure of 65 psia and 60°F. where the complete cycl eated.

Feed gas liquefaction is always assured by relating the required temperature for liquefaction directly to the refrigeration system. This s ɔ prohibits power from being wasted at lower gas throughputs.

Refrigeration efficiency is monitored by utilizing a multipoint temperature recorder on the refrigerant exchanger. The recorded temper nediately tell the attendant if one of the refrigerant components requires adjusting which is accomplished in a very short time by either addi efrigerant or the removal of refrigerant by venting and subsequent addition of the necessary components. Refrigerant composition adjustme infrequently required as pointed out earlier because of the leakproof design on the refrigerant system. The design pressure of the entire refr tem is350 psig to prevent refrigerant losses during plant shutdown.

.3 Refrigerant Make-Up

To minimize power requirements and maintain a high operating efficiency, the liquefaction system refrigerant gas mixture should be cl ısted for refrigerant losses on a weekly basis.

The operator, by means of a laboratory gas chromatograph will be able to determine the refrigerant gas composition and quantity of ividual II refrigerant make-up required. The refrigerant make-up system consists of refrigerant storage vessels and metering equipment as s mechanical flowsheet A1-17 in the "Appendix" section. Each one of the six (6) refrigerant components is stored individually with each refrige ;sel having in excess of one (1) charge.

Quantities of refrigerant make-up are preset on the meters and automatically metered in.

Nitrogen, methane, and ethane will be loaded as a gas. Propane, iso-butane and iso-pentane will be loaded as a liquid.

Refrigerant make-up will flow into the sweep gas line which flows to the compressor suction scrubber D-104 and uses warm refrigeran npressor discharge gas as a carrier medium.

3. 4 Deriming

Deriming consists of removing, from either the feed gas section or the refrigerant section of the cold box, contaminates whose freeze ɪ ɔve the operating temperature of the cold box.

The contaminates at low temperatures solidify and cause operational problems by plugging of the exchangers. The plugging action can ected by a decrease in ability to liquefy accompanied by an increase in pressure drop across the section of the exchanger that is plugging.

Plugging of the feed gas section will normally occur as a result of upset or poor operation of the dehydrators. The three (3) main ıtaminates would be moisture, CO_2 and aromatic compounds, such as benzine, naphthalene and their derivatives which contain an unsaturat custom atoms. It is important to see that the dehydrator is operating properly and maintains water level below 1 ppm (volume basis) and th ɜvel below 50 ppm (volume basis).

Plugging of the refrigerant section can only occur either by heavy contaminated refrigerants or an upset or improper operation of the igerant compressor seal gas system.

Both the Feed Gas Section and the Refrigerant Section, as shown on mechanical flow sheets A1-11, 12 and 13 in the "Appendix" sectic v... n for using warm dehydrated natural gas for purpose of deriming. The deriming gas is piped to allow venting to both the flare or back t

The deriming system has been designed to allow the turbine to be operated during the complete deriming procedure.

LNG Storage System

The LNG Storage System consists of a LNG storage tank, boil-off compressor system and LNG sendout system. The LNG storage syste e three (3) modes of operation which can be classified as "Filling", "Holding and "Sendout"

The LNG storage tank is an above ground, double walled, cryogenic. The normal inner tank capacity will be 1,200 MMSCF (384,000 b
iid natural gas. The inner tank will be constructed of 9% nickel steel providing a design temperature of -260 °F. The inner tank will have a d
163' and a height of 98'. The outer jacket will be constructed of carbon steel and designed for 1.0 psig internal vapor pressure, plus wind, s
thquake loads for the Chattanooga area.

The tank insulation system is designed for a maximum daily boil-off rate of 0.05% of a full tank of LNG with an ambient temperature
: side walls will have an insulation space of 60 inches which will be filled with expanded perlite. Under normal conditions, the tank pres
c...rolled at 0.5 psig by means of the boil-off compressor.

In addition to the boil-off compressor additional instrumentation and valves are provided to admit gas to or vent gas from the tank du
iormal weather conditions or failure of the boil-off compressor.

The tank is also equipped with pressure vacuum relief valves located at the top of the tank. The relief valves are the primary relief de
I are designed to relieve tank pressure for emergency conditions of fire or abnormal atmosphere pressure changes up to 0.3 inches Hg per I

An electric tank heating system consisting of buried resistance cables is installed beneath the tank to prevent freezing of the soil and
ompanying heaving. The heating system is controlled by a temperature indicator located on the control panel. The controlled sensors and cc
average temperature at the sand fill area beneath the tank.

The internal tank is furnished with a temperature monitor system for observing tank temperatures during cooldown and also provide a
:he tank level system.

LNG from the liquefaction section will enter the tank through a distribution header provided in the tank for cooldown and filling. The cc
ider will be located below the tank insulated ceiling and used primarily in cooldown of the tank. The fill header will discharge LNG at the bott
tank. The distribution of LNG into the two headers will be determined by tank conditions.

4.2 Boil-Off Compressor System

Under normal conditions, the pressure in the LNG storage tank will be controlled by the boil-off compressor regulating flow from the ta

The boil-off system is designed to handle 1,064 MSCFD of -200 °F. gas resulting from boil-off, liquefaction flash and normal changes in
ometric pressure. Vapors from the LNG tank are recompressed to a pressure of 250 psig for return to the pipeline, by means of the 4" P-16(
I 12" P-2004-204A. See Drawings A1-13 and A1-16 in the "Appendix" section.

The boil-off compressor is a packaged screw compressor completely piped with after cooler and warm gas recirculation. The compress
igned for -70°F. operation and warm discharge gas is circulated to warm compressor suction from -200°F. to -70°F.

The boil-off compressor has an electric drive with capacity control set by the tank set by the tank pressure controller. Compressor will
range of approximately 10:1. During power failures, the compressor will be out of operation and tank boil-off will be vented to the
iosphere.

LNG Vaporization System

The LNG vaporization system is designed to revaporize LNG for delivery to the pipeline during periods of peak gas demand at rates up
SCFD.

Revaporization will be by means of three (3) vaporizers, H-102 A, B & C, each designed to deliver 30 MMSCFD of gas at a sendout pre:
) psig and 60°F. Each vaporizer will have a 5:1 turndown ratio or 10:1 for the vaporization system giving a sendout range of 6 to 60 MMSCFI

Vaporization ratio will be set and controlled by automatic flow controllers located in the central control room.

LNG for vaporization is pumped from the LNG tank by vaporizer transfer pumps P-101 A & B. See Flowsheets A1-14 and 15 in the "Ap
tion. The LNG is pumped into the 6" P-1406-204 K circulating header which provides LNG to all the vaporizers and truck loadout.

The circulation pressure is maintained at 350 psig by means of back pressure regulation PV 55 located in the Recirculation Line 2" P15(
ween peak demand periods, the circulation header can be maintained in a cooldown condition by using LNG circulating pump P-102.

The heater is furnished with automatic firing and shutdown controls which will place the heater in a fail-safe shutdown condition for eit
lame, high stack temperature, or low vaporizer outlet gas temperature.

On shutdown, in addition to the fuel gas valves shutting and venting, the vaporizer LNG inlet and vaporizer LNG outlet valve will close
vent cold (-20°F.) from entering the pipeline.

During vaporization, cold LNG entering the vaporizer coils will condense water vapor present in the combustion gases. The condensed
drain from the caporizer bottom during operation.

Metering and odorization of outgoing gas will be provided for by Chattanooga Gas Company and will be separate from these facilities.

3. PLANT UTILITIES

F...t Fuel Gas System

Except for turbine fuel gas requirements, all plant fuel gas will be supplied from 12" P-2004-204A plant out going gas header. See mec
vsheet A1-20. The fuel gas system supply pressure is regulated by PIC-14, which is set at 150 psig for summer operations and 200 psig for
:rations. Pressure reduction is made at the individual gas user as required.

During the Liquefaction period the main sources of fuel gas is re-generation gas from the dehydrators and boil-off gas from the LNG st

Instruments in the control room and field located instruments and valves connected with the central control room instruments will t
nished with instrument air. Local instruments and valves will be furnished \ with dry instrument gas. The mechanical flow sheets A1-11 th
designate instruments and valves furnished with dry instrument gas.

Instrument air is supplied by a packaged Ingersoll-Rand Model 71TD, single acting two stage lubricated, air cooled, air compressor
heat-less type air dryer and filters all mounted on an 80 gallon horizontal air receiver. The air compressor will be driven by electric mo
: drive.

The air compressor will deliver 35 SCFM at a pressure of 100 psig. This rate will provide air at approximately 200% of the basic inst
uirement.

The dryer will be of the heatless type and sized to dehydrate 35 if SCFM of 100 psig inlet air at 110°F. to an atmospheric dewpoint o
:h tower will be charged with activated alumini. Dryer controls shall be mounted in a NEMA 4 cabinet. The dryer shall be arranged for cont
omatic operation on a 10-minute cycle, and shall be fail safe, thus providing flow of air through the tower in case of power failure. Each to
'e a pressure gauge and relief valve.

The dryer will be furnished with two (2) oil removal pre-filters and two (2) after-filters to allow changeout of filters during operation.

The compressor is equipped with dual control to provide either constant speed operation with automatic-load or unload control or au
rt-stop operation.

The instrument gas header will normally use dehydrated gas supplied from downstream of the feed gas filter by 2" IG-1109-204A.

During startup, instrument gas will be supplied by the startup/bypass tied into 8" P-2001-204A inlet gas header. Both the instrument
ider and the instrument gas header are provided with low pressure alarm and shutdown.

Process Cooling Water System

The process cooling water system is a closed cycle cooling system using a cooling tower for heat rejection. Cooling water is circulatec
tem at a rate of 3300 gpm by cooling water pumps P-103A or B. Cooling water is circulated in the plant with a 14" CW-1802-219 cooling w
ıply header and a 14" CW-1217-219 cooling water return header with branch supply and return headers supplying cooling water to users list
l as shown on drawing A1-18.

rvice	Rate
bine Shell Exchanger	100 gpm
bine Oil Exchanger	200 gpm
ant Compressor Oil Exchanger	100 gpm
.ant Compressor Seal Gas Exchanger	50 gpm
rigerant Condenser E-102	2800 gpm
	3250

The cooling water system is required only during the liquefaction cycle. The system will be drained for winter operations. The air comp
l boil-off compressor were purchased with aerial coolers.

A two-cell inducent draft type cooling tower is used to cool the water -from 105°F. to 80°F. The tower has a duty rating of 40,000,000
ver sizing is based on a wet bulb temperature of 73°F.

Cooling tower water make-up requirements are estimated to approximately 76 gpm for evaporation and draft. Water make-up require
blowdown can vary from 15 to 50 gpm, depending on quantity of city water. Water make-up will be automatic and controlled by a ball float
:rated valve sensory cooling tower water basin level.

The cooling tower water treatment will be on a continuous or intermittent feeding of chemicals by a packaged chemical feeder tagged

Cooling system blowdown for control of solids will be on a manual basis. A flow indicator FI-23 and manual valve FI-23 as shown on fl
:et A1-13 is furnished to allow the operator to set the blowdown rate.

Potable and Utility Water System

Forty (40) psig city water will be taken at the northeast boundary of the plant limits and distributed through an underground main 4"
)1-218, to hose connections for service water in the process area, drinking and sanitary water at the control building and as cooling tower m
ıply. See mechanical flow sheet A1-18 for services and lines.

It is estimated that average water demand rate will be in the order of 100 gpm. Of this, 76 gpm will be for cooling tower evaporation a
ke-up. Twenty-two (22) gpm for cooling tower blowdown makeup and 2 gpm for process hose connector and control room requirements. Co
'er water makeup requirements for evaporation and blowdown will vary considerably with changes in ambient temperatures and quality of ci
:er.

The plant water requirements will be metered by a totalizing meter supplied by the city and located at the plant boundary limit.

Plant Nitrogen System

A bulk gas supply system complete with a plant nitrogen distribution header is furnished for continuous purging of the coldbox, refrige
ke-up, snuffing gas for LNG tank vent and for purging of other services as shown on mechanical flow sheet A1-18.

It is estimated that the normal nitrogen demand ratio will be in the order of 150 to 300 SCFD. The cold box will require a continuous p
e of 150 SCFD to keep the cold box at a positive pressure to prevent the entry of moisture laden air into the cold box insulation. Any moistu

The plant is provided with a closed vent system using three (3) vent stacks to vent gases from the LNG storage tank and from safety ves in the vaporizer and liquefaction areas.

The LNG storage tank is furnished with combination relief and vent valves to handle emergency conditions of fire and barometric pres inges. Gas from these valves will vent to vent headers piped to tank vent stack VS-101, located on top of the LNG storage tank. See mecha v sheet A1-14.

Cold gas from these vents will discharge at a height where the gas can be safely dispersed. The LNG tank vent stack is also furnished ı.. uetector and N_2 snuffing gas system to handle possible vent stack fires which could occur during a lightning storm.

Cold gas from the vaporizer and truck loadout relief and vent valves will be piped to vent stack VS-103 as shown on mechanical flow : ·19.

Refrigerant and process gases from relief and vent valves in the liquefaction and refrigeration storage area will be vented to process v ıder 14" BD-1901-203A, as shown on mechanical flow sheet A1-19. Since most gases from this area are heavier than air, gases from this h vented to knockout drum D-10A, for knockout of liquids, then on to the process flare stack where the vent gases are flared. The flare stack ıished with a John link flame front generator and pilot system to allow a continuous flare pilot.

Process Drain System

To provide the plant with a degree of pollution control, the process area is provided with a closed process drain header 4" PD-1902-22 ıwn on mechanical flow sheet A1-19. This header will drain all process fluids to a process sump tank ST-106. Fluids will be retained in this ta trucked away.

A process sump tank pump P-105, is provided to either pump non-contaminated water to surface drainage pump out or to pump oil ıtaminated water to a truck.

The process sump is also provided with a vent header equipped with a flame arrestor for purposes of venting hydrocarbon vapors.

3 Storm Drainage

Disposal of storm water from the process area is by means of roadside ditches and culverts to the Hawthorne Street drainage system. :hes and culverts should be kept free of trash and debris for proper operation.

Disposal of storm water from the diked area is by sump pump (P-104). , Discharge from this pump follows the natural drainage in the more than twelve (12) hours after storm water starts accumulating within the diked area, P-104 should be started or a check should be ma ermine the need for starting. A more frequent check should be made if, at some future time, the property to the west is developed.

tary Sewage

Disposal of sanitary sewage is through septic tank and drain field. (See drawing A4-7A for location plan and details of septic tank and d system).

Under normal conditions, no additives should be required for start-up of this system. Should an upset occur at some future date, bacte :ures for restarting the biological process are available for sweetening the system should H_2S generation become excessive. All gases produc ›elled through the soil pipe building vent above the roof.

Periodic removal of sludge from the septic tank compartments is required. The first period should be one year with subsequent periods usted on the basis of material quantity produced during the first period. Several companies are available in Chattanooga that can provide a ı ıoval service.

Care should be exercised when working in a septic tank compartment because of the lack of free oxygen and the presence of harmful ethane, carbon monoxide, hydrogen sulfide and sulphur dioxide). These areas should be treated as any other methane source in avoiding an ›losion hazard.

4. PLANT INSTRUMENTATION

General

The plant instrumentation is designed for automatic liquefaction operation on a semi-attended or attended basis and vaporization on ar ›matic attended basis. A central control building is provided with central controls for controlling liquefaction and vaporization rates and centr ‹unciation of shutdowns. All other controls will be local.

LNG Facilities

.1 Feed Gas Treating

Admission of pipeline gas to the plant and feed gas treating is controlled by the plant shutdown block valve UV-01. The operation of th ontrolled by the plant shutdown system which is described in Section 8.

Gas to be treated flows to the dehydrators D-102A, A, B & C where a time cycle controller KC-01 mounted locally at the dehydrators c ıy..ator switching valves KV-01 thru KV-19 to achieve a programmed absorption, regeneration and cooling cycle. Lights will be furnished bot local controller and central panel to indicate dehydrator or absorption cycle.

Total treated gas flow is controlled by FRC-01 which controls treated gas flow to the liquefaction section and FRC-02 which regulates tr : flow for regeneration purposes.

Treated gas from the dehydrator will flow thru filter separator F-101 to the liquefaction section. The filter will be provided with a differ

3 Liquefaction

.1 Cold Box

Liquefaction rate thru the cold box is set by treated gas flow controller FRC-01. Flow indicators are furnished to manually balance flov -old box three (3) cores. The gas passing thru the cold box is liquefied and pressured to the storage tank.

CO_2 content of the treated gas is monitored and alarmed by CO_2 analyzer AR-01. Moisture content of treated gas is not monitored sin correlation between CO_2 level and moisture level. Fouling of the gas liquefaction side of the cores by CO_2, moisture, etc., is detected by a erential pressure indicating alarm.

Liquefaction of LNG within the cold box and performance of the cold box refrigerant stream is monitored by a temperature recorder h nperature measuring points on the cold box inlet and outlet streams plus points spaced the length of the cold box cores. These temperature provide the operator with a trend indication and also indicate if each refrigerant component at the refrigerant mixture is functioning proper nperature of the LNG is controlled by TRC-13 whose output sets the refrigerant flow controller set point.

.2 Refrigerant System

Refrigerant flow through each core is controlled by valves F-101A, B & C. FRC-03 regulates the refrigerant compressor vanes and also npressor minimum flow bypass valve. During operation, the refrigerant compressor turbine driver speed is set manually by HC-02. This kee igerant flow controller FRC-03 within operating range of the vanes. On start-up or conditions when refrigerant flow demand is below 60 per flow controller will take over control of the compressor minimum flow bypass valve FV-03 to prevent the compressor from surging.

Cold box refrigerant action is controlled by auto-refrigeration valves L FV-101 A, B & C.

Refrigerant flow from the compressor to the cold box will first be partially condensed in the refrigerant condenser E-103. Condensed igerant liquid is pumped under flow control FRC-18 to the liquid header. The header splits the liquid flow into three streams which flow indi each core. Trim valves in the liquid lines are provided to allow fine adjustment.

In the cold box, the performance of the refrigerant mixture and each component, as the refrigerant mixture is passed through the colc es, will be monitored by multi-point temperature recorders. The recorders will provide refrigeration trend indication and also indicate if the igerant mixture is deficient.

The refrigerant compressor turbine driver C-101T in addition to standard turbine start-stop controls will be furnished with instrumenta icate and utilize additional horsepower which will be available due to lower ambient temperatures. This additional horse-power will be made ilable by controller TDIC-31 which will sense turbine exhaust temperature and will compare this to the maximum permissible turbine exhaus nperature. This difference is expressed as available horsepower and TDIC-31 is designed to increase treated feed gas controller FRC-01 set- available horsepower is utilized.

Refrigerant mixture is analyzed and refrigerant added to the system on a manual basis. A laboratory type chromatograph is provided i ntrol room for analysis of refrigerant samples obtained by use of sample bombs.

.3 Deriming

Local controls are provided for deriming both the feed gas section and the refrigerant section of the cold box.

The feed gas section is derimed by feeding treated heated gas to the cores and also heating gas leaving the cores to protect downstre bon steel vent piping. The preheating and after heating is accomplished by local temperature controllers TIC-32 and 33.

The refrigerant section of the facility is derimed with the refrigerant compressor running. Deriming is accomplished by purging with dr ated gas introduced into the compressor suction and bled from the compressor discharge. The purge rate of gas to and from the refrigerant ndicated by flow indicators FI-19 and FI-20

LNG Storage

The LNG storage tank will have instrumentation to provide boil-off pressure control, tank temperature, and level indication.

Tank pressure will be sensed and controlled by PRC-13 which will either regulate boil-off compressor C-102 flow rate, pressure vent va or pressure pad valve PV-13B to maintain tank pressure.

The tank is provided with temperature points to measure temperature inside the tank at selected points on the tank bottom and side. nperature points are recorded and will provide both temperature monitoring and as a back-up level indication.

The tank will have two level measuring systems. One level indication will be by means of a tape and float system and will be local. The el indication will use a d/p cell and will provide both local and control indication.

Vaporization

The vaporizers will have instrumentation for setting vaporization rates, vaporizer permissive firing controls, and vaporizer shut-in contr

Each of the three vaporizers will have flow recorder controllers located on the control panel to allow the operator to set the vaporizatio n the control room. The flow controller will measure gas from the vaporizer and will regulate a control valve on the LNG feed to the vaporize orizer will have approximately a 5:1 turndown.

The BS&B vaporizer will have FIA approved permissive firing controls mounted locally. Vaporizers will be started and shut down from t ng panel. Firing of the vaporizer will be controlled by a local temperature controller which will control fuel gas-air valves to maintain the vapo outlet temperature at 60°F. The permissive firing control system will have flame detection, air and gas pressure and stack temperature per

Controls for flare stack flame generator.
Local meters and elements for metering gas flow to and from the plant.
Flame detector, alarm and shutdown system.

5. PREPARATION FOR START-UP

neral

Preparation for start-up will cover field inspection, testing and checkout of all vessels, piping, electrical instrumentation, and also run- uipment to insure that all equipment has been installed per drawings and all equipment is operational. This checkout of the facilities will be formed by J. F. Pritchard and Company during the final stage of construction. A daily log book and check list will be maintained for purpose nning and scheduling.

Field Inspection of Piping and Equipment

In addition to shop inspection of all equipment, J. F. Pritchard and Company will also make a field inspection of piping and equipment the following:

Details of the equipment such as vessel internals, etc., agree with the drawings.

Routing of process and utility lines versus flowsheets and piping drawings.

Vessel internal passages, nozzles, downcomers, etc., are free of obstructions such as sand, scale, or construction debris.

Valves are properly located and accessible. Low points are drained and high points vented.

Check valves are properly installed.

Temporary strainers are installed and a list kept of strainers and blinds.

Manufacturer's instructions are checked to be certain installation is complete and operable.

That pump rotation, nameplate speed and horsepower agree with pump and driver data sheet. That preservative oils are removed and opera ricants are installed. That temporary suction strainers are installed.

Motors are checked for alignment and starter size, etc.

at compressor units, auxiliary equipment, etc., are assembled in accordance with manufacturer's drawings. That lube oil piping where rec ifications are cleaned and pickled. That operation of controls, auxiliaries, and safety devices are in order.

That air coolers are undamaged and that fins are tightly bonded to tubes. That fan rotation, blade setting, motor horsepower agree with dra l specification sheets. That louvers operate properly if furnished. That belt and guards are tight if furnished. That bearings, gears, pillow box lubricated.

Check that control valves are properly installed; instrument take-off points properly located; thermowells and thermocouples are installed a nnected; board mounted instruments operate the correct valves; and that valve action is correct.

That blinds are installed under safety valves prior to testing and then removed.

That orifice plates are removed for testing and then installed after testing.

Hydraulic and Pneumatic Testing of Piping and Equipment

All piping services will be field leak tested or pressure tested in accordance with 831.3.

Vessels will be hydro tested in vendor shops per ASME code and will not be re-tested in the field.

Where applicable, piping shall be tested with clean fresh water; except oil piping shall be tested with air; instrument air and instrumen ader piping will be tested with air; services, such as treated gas, refrigerant and cryogenic piping, will be pneumatically tested with dry nitrog

Drains, combustion air and engine exhaust piping will not be tested.

ak Testing

Instrument air and instrument gas headers will be leak tested with air. Leak tests will be performed at approximately 100 psig and all ds, and screwed piping shall be taped or soaped as required to check for leaks.

ssure Testing

The following test pressures will be used for pressure testing the various services:

drostatic Testing

w Sheet A1-11	Spec.	Design Press.-PSIG	Test Press.-PSIG
gas piping on flowsheet to be dro-tested except:	204A	250	

)2		219			
w Sheet A1-14					
P-2006 & P-2007		204A		250	
·' ˋeet A1-15					
P-ı503, 2" FG-2013 & 2014	204A		250		
w Sheet A1-16					
P-1601		204A		250	
w Sheet A1-18					
piping on Flowsheet A1-18 except :rument air piping to be hydro-tested.	204A 219		250		
w Sheet A1-21					
Jrotest cooling water lines only.	219				
w Sheet A1-22					
Jrotest cooling water lines only.	219				
eumatic Testing					
w Sheet A1-11					
P-1102 & 2" P-1108 IG-1109 P-1112		204A 203A		250	150
w Sheet A1-12 gas, hydrocarbon liquid and oil piping l equipment on flowsheet to be 'ic tested. ; .ng 6" P-1103 & P-1219 Jrotested with piping on Sheet A1-11.		204A&AX		380	
w Sheet A1-13					
piping & equipment on Flowsheet -13 to be pneumatic tested.	203K&204K	204A&AX	275,350	350,350	
w Sheet A1-14					
piping & Equipment on wsheet A1-14 except lines P-2006& P-2007)e pneumatic tested.	204A 203K		250 275		
		204K		750	
	230				50
w Sheet A1-15					
piping & Equipment on Flowsheet -15 except lines 8" P-1503, FG-2013, & 2" FG-2014)e pneumatic tested.	203A 204A		250		100
		204K			
	203				50
w Sheet A1-16					
piping & equipment on Flowsheet -16 except discharge line ' P-1601 to be pneumatic tested.	203K		100		
		230K 204A		100 250	
w Sheet A1-17					
r ꞁ & equipment on Flowsheet be pneumatic tested.	203A Vent		150		
	203A Process		275		
		204A		350	
		204AX	350		
		206A			
w Sheet A1-19					
vent piping to 14" BD-1901-203A		203A		150	

oil and gas piping on flowsheet A1-22 be pneumatic tested. Cooling water ing to be hydrotested.

uirement for Hydraulic and Pneumatic Testing and Cleaning of System

Lines which tie into piping at the cold box, Item E-102, shall be leak tested with nitrogen from the last flanged connection upstream through d box to the first flanged connection downstream.

TE: Water must not be allowed to enter the cold box or its associated piping and a nitrogen pad must be maintained on the cold box pressur nponents from its arrival to startup except for periods during piping connection and installation or valve bonnets and operators.

All lines connecting to lines entering and leaving the plant shall be tested prior to connection to the field lines.

Pressure testing and flushing or blowing with air, of all lines and equipment when applicable, shall be completed as part of final construction cedure.

Test records shall be made of each piping installation during the testing, including date of test, identification, test pressure and approval.

Items such as valve seats, selas, expansion joints, which may limit test pressure shall be identified prior to testing, and special care shall be ercised during testing to prevent damage to these items.

Vessels and packaged skid mounted equipment need not be re-tested in field, but may be tested through in a system, if approved by the Cor

Exchangers (shell and tube equipment) shall be pressure tested for damage in shipment. Contractor shall be advised of maximum allowable erential pressure across tubesheets before testing.

All equipment and piping may be insulated before pressure test, but all joints, including thermometer wells, are to be left un-insulated and e ing test.

Flanged joints used to blank off equipment need not be re-tested.

All instrument leads shall be blocked off or disconnected before test. Block and bleed all level control float cages.

Orifice plates shall be installed after lines have been tested and flushed.

Ls shall be flushed or blown through control valve by-pass with control valves open during test.

All magnetrols, safety valves, and rupture discs shall be removed during testing and flushing.

Block and bleed or remove all pressure gages during pressure test.

Instrument tubing systems shall be pneumatically tested using bubbler method.

All lines shall be broken at the entrance to equipment, and the line flushed and blown out. Lines which were tested with air or nitrogen shall hed. Lines shall not be flushed into pumps. Pumps shall be blocked in and case drains open during test.

Final cold alignment of rotating equipment shall be done after testing, flushing, and removal of screens.

Rotating equipment, valves, etc., shall, when necessary, be operated by Vendor personnel or shall be operated under their direction during l flushing operation.

Instrument Checkout and Testing

Qualified instrument technicians will be provided by Pritchard to completely check out and calibrate all components and loops in the rumentation system, prior to plant start-up. A formal record of this check will be made. This record will show the item and loop checked, the l date of the check and the initials of the technician performing the check. A suitable tag or seal will be placed on all components successfully cked to prevent unauthorized personnel from tampering with the device after it has been calibrated.

.1 Instruments

Where practical without actual plant operation, all units will be field checked to verify that the peoper range has been provided. Pressur ices will be checked by means of a dead-weight tester or a suitable inert-gas supply with a precision gauge and regulator. Differential head c be checked with a manometer. Temperature devices, where the range is low enough for a test, will be checked by means of a hot oil bath a cision test thermometer. Where practical, float type level devices will be checked by moving the float with a rod. In general, the manufacture ommendations and procedures will be followed in all cases. The tolerance guaranteed by the manufacturer will be attained before the instrun is ed acceptable.

.2 Control Valves and Operators

All control valves and operators will be stroked through their full range to insure proper stroking direction and proper seating. A valve may be sidered to be seating properly if the indicator on the stem so indicates at the proper signal except butterfly valves and they will be checked v cision protractor. Valve positioners will be set to the proper air signals.

Valves requiring operators will be supplied by the Company with the operator installed, limit switch set and valve stroked ısmitter to simulate the actual process measurement. All devices will be calibrated to the tolerances listed by the manufacturer. Controller be set at best predicted optimum settings for start-up conditions.

.5 Pressure Safety Valves

Pressure safety valves, operating on the control pilot principal, will be field checked for the proper relief and blowdown settings. The c ·will be removed and bench checked on a test fixture.

.ب Level Gages

All level gauge glass hold down nuts will be checked with a torque wrench prior to hydrostatic testing to insure proper torque and eve sion.

.7 Charts

The correct charts will be installed on all instruments and the pens inked with the proper colored ink.

Electrical Checkout and Testing

Ͻeneral

The one-line diagrams, schematic diagrams, and the installation, operating, and maintenance instructions by the equipment manufact ıuld be thoroughly studied and completely understood by the operators before applying power and operating the equipment. A check should de to assure that the construction drawings and the equipment manufacturer's instructions has been adhered to.

The following is a list of specific checks and reviews to be performed by J. F. Pritchard and Company.

ᑭhasing will be checked for continuity throughout the plant at each piece of equipment. Phase rotation will be the same throughout the plant

ᑭroper grounding will be made at each piece of equipment as required by the codes.

ᐱll wire connection will be to the proper terminal as indicated by the wiring diagrams. These will be firm and tight for minimum resistance ınections.

ᐱll equipment will have their proper settings and adjustments made before applying power.

ᐱll fuses, circuit breaker and overloads will be checked for proper voltage and current ratings for the particular circuit.

.ll manual and combinations motor starters will be checked for proper size and all overloads are of proper size and in place.

.vitches, circuit breakers, motor starters and control station will be in the "off" or "open" position before power, is applied.

ᐱll batteries will have the proper type of electrolyte and will be at the marked level. All batteries will have full charge before start-up of plant

ll motors will be checked for proper rotation with phase rotation. All other equipment mechanical movement will be coordinated with phase r

.ll transformers will be checked for proper type of oil and be at the marked level. The purity of the oil will comply to the specifications.

ᐱll construction electrical standard tests will be performed such as meggering, hi-potting, voltage, continuity, grounding resistance, "ringing ‹ . These tests will be in accordance with standard practice.

.ll electrical equipment will be clean from dirt, dust, and, foreign matter for good contact and smooth operation.

Proper ventilation will be given to all electrical equipment I. for heat removal.

Γhe necessary lubrication will be applied to all electrical equipment where required.

Nhere interlocks are used, the proper functions will be checked.

ᐱll electrical equipment will be checked for removal of shipping blocks and holding bolts so that no binding on moving parts is encountered.

ll electrical equipment will have a visual check for damage and replacement of parts before applying power.

ıll electrical equipment will have a visual check to see if all components are in their proper place, not missing nor loose.

ᐱll light fixtures and pilot lights will be checked for bulbs in place.

.ll electrical equipment will be checked so that all safety locks, fences and other devices are in place so that only authorized personnel may o : equipment.

ᐱ ·ual inspection will be made to see that no "live" bus, wire, or contacts are open to personnel when the equipment is in operation or "hot

ᐱ ..eck will be made for excessive high temperature on all electrical equipment after power is applied.

A record of all equipment tests will be made and given to Owner.

Equipment Checkout and Run-In

Proper equipment checkout and run-in will require a preliminary operation of all machinery to check its dependability. Checkout and st

d. 440 Volt Motor Control Center
MCC No. 1
MCC No. 2

e. Low Voltage Power Center

f. 480 Volt Substation Motor Control Center

g. 125 Volt D.C. System

Control Room Equipment

a. 480 Volt (Generator) Switch gear

b. Transfer Motor Control Center

c. 125 V.D.C. Motor Control Center

d. Alarm and Shutdown Relay Panel

e. Instrument Process Control Panel

f. Laboratory Chromatoqraph

Auxiliary Equipment

a. Emergency Generator

b. Instrument Air System

Inlet Gas Area

Gas Treating Area

a. Refrigerant System

b. Cold Box Area

Storage and Sendout

Vaporizer Area

Cooling Tower

Other Plant Facilities

6. START-UP OPERATING PROCEDURE

General

Prior to the introduction of pipeline gas into the Feed Gas Treating area, all pre-start operations such as testing, checkout and run-in o iipment per manufacturer's instructions must be completed. Also, all utility systems should be placed in an operating condition. This entails t owing:

Instrument air compressor and dryer C-103 running and maintaining instrument air header pressure of 100 psig. Also, all instrument air user ced into service.

All process instruments are on manual control to prevent windup. Utility instruments affected should be on automatic control.

ctivate the emergency shutdown system (Logic System No. 1) by depressing the ESD reset button located on the main control panel. With t rument air system and fire detection system being operational, the emergency system can be placed into service without a shutdown being iated. Panel alarm lights UA-01-23 and 24 located on the main panel and shown on flow sheet A1-17 will indicate if system is operational.

The Power and Instrument Gas Header 2" IG-2002-204A shown on Mechanical Flow Sheet A1-20, is placed into service using gas furnished b Start-Up Bypass valve, until the Feed Gas Area is placed into service and dry gas can then be furnished from the Gas Treating Area by 2" IG- 4A.

The utility, potable and cooling water systems have been placed into operation. This requires that the cooling tower fans and cooling water p 0 or B are running and the chemical injector system PK-101 is in operation.

The emergency generator EG-101 has been checked for operation and is now in a ready to operate condition.

Feed Gas Treating

On initial start-up, prior to introduction of pipeline gas, the following should be checked.

All pre-start-up conditions described under the 'General' section have been completed

To establish inlet gas flow through the gas treating section, the 1" pressure equalizing valve around the plant inlet shutdown valve U P-2001-204A is slowly opened Ito pressurize the plant inlet header, gas treating area and the plant outgoing header 12" P-2004-204A. Lov ssure alarm lights UA-01-12 and 31 will reset when the plant inlet and outlet are pressurized. When the headers are pressurized, the gas t a section emergency shutdown system can be activated so plant inlet shutdown valve UV-01 can be opened. Until the turbine is started an ning, assuming all other shutdown conditions associated with the gas treating area shutdown system are satisfied, the gas treating area sl tem will be activated by a Key Switch located on the control panel. This switch allows bypassing the turbine shutdown interlock. The contr ve a light to indicate when the-Key Switch is in the bypass position, with the switch turned to the bypass position. The operator may nc nt shutdown valve UV-01 by locally resetting solenoid valve UY-01 which in turn supplies power gas to valve UV-01.

With valve UV-01 open, the fuel gas supply system may be put into service by partially opening 3" manual Fuel Gas Start-Up Bypass wing gas to flow from 8" P-2001 plant inlet header to 12" P-2001 plant outlet gas header. When regeneration gas rate to plant outgoing h e exceeds 2.5 MMSCF, the 3" manual bypass valve will be closed. The plant fuel gas pressure controller PK-14 will hold the plant out-going pressure of 150 to 155 psig. With fuel gas supply established, the following gas users can be placed into service:

Emergency Generator, EG-101
Control Building Fuel Gas Supply
Vent Header Purge, FI-15
Flame Front Generator, VS-102

By means of local flow controller FRC-02, a minimum gas flow will be established to remove heat from the regeneration heater, H-10 v will be in the order of 15 MMSCFD; till the turbine is brought up 60 to 80% speed at which time regeneration gas rate will be increased to SCFD for regeneration of the dehydrator, D-102AB&C. Till the dehydrators have been regenerated, treated gas flow valve FV-01 will remai

On initial start-up for hot alignment run, the turbine driver will have to be disconnected from the York compressor and operate for the pose of producing regeneration heat for regeneration of the dehydrators. This heat is provided by means of regeneration waste gas heater unted on the turbine exhaust. Regeneration gas temperature will be controlled by TIC-02 which will regulate TU-02 to blend cool regenerat h hot regeneration gas from H-101 to provide a constant regeneration gas temperature of 650°F to the dehydrators.

The turbine driver will be disconnected from the York compressor by removing the dry coupling between the Western load gear and tl npressor. Dropping the coupling will require about one to two hours.

Start-up and operation of the turbine will be covered in the G. E. start-up manual. Prior to starting the turbine regeneration gas coole uld be placed into service. Once the turbine has been started and placed into operation, the emergency system Key Switch should be taker bypass position. To regenerate dehydrators ID-102A, B&C, regeneration gas flow controller FRC-02 flow should be slowly increased to esta eneration gas flow rate of 7.069 MMSCFD and time cycle controller KC-01 placed into service with the controller start of anew cycle.

The time cycle controller by a built-in preset programmed operation of switching valve KV-01 through KV-19 will automatically step e ydrator through two (2) hour periods of adsorption, heating and cooling to provide a six (6) cle operation. Lights are provided on both the local controller and on the central control panel to indicate which tower is on adsorption. own or power interruption occur, the controller will prevent the towers from advancing out of sequence by stopping and holding the las ition till power and gas flow are restored.

Regeneration of the dehydrator is monitored by temperature points TJR 05-4 measuring hot regeneration gas to each dehydrator and nperature point TJR-05-1 measuring the temperature of gas leaving the dehydrator being regenerated. During the two-hour regeneration pe hot regeneration gas leaving the dehydrator will be cooled by regeneration gas cooler E-101 to 125°F. Should exit temperature reach 150° nperature switch TSH-30 will shut down the gas treating area. On initial start-up, the dehydrator will be required to be run through three (3 nsure proper regeneration of the molecular sieve beds.

When the dehydrator beds have been regenerated, quality treated gas flow can be established by opening the 4" block in front of the filter and the two (2) 3" manual valves on the dehydrator start-up bypass to direct gas back to the plant outgoing header. To determine if lecular sieve is completely regenerated, the treated gas should be erted to the pipeline for a complete adsorption period of the dehydrator with the CO_2 analyzer, AT-01 monitoring the CO_2 profile of the treat CO_2 level should always be below 50 ppm for the complete cycle. There is a correlation between CO_2 level and water content of the treatec en the CO_2 level is below 50 ppm, the water content will always be below 1 ppm (below −150°F). If the dehydrators are not properly regene CO_2 content will exceed the 50 ppm mark before the 2-hour adsorption period is complete.

3 Liquefaction System

nitial Start-Up

Initial start-up of the liquefaction system will be a continuation of the feed gas treating start-up since the turbine compressor has to b operation, for the regeneration of the dehydrators.

Initial start-up procedures are basically to remove nitrogen and moisture from the system and to load refrigerant. These procedures s d any time shutdown for maintenance has allowed the moisture level in the system to rise. Since, normally, a nitrogen purge will have beer or to maintenance work, a methane purge is required to dry the system to below 10 ppm water. It is essential that moisture be removed fro tem prior to starting the system, since moisture in the refrigerant loop or on the feed gas side will solidify at the low LNG temperatures of –

.2 Feed Gas Dehydrators

The feed gas dehydrators were regenerated prior to plant shutdown. Feed gas will be passing through D-102A, B or C by the following cess.

To establish inlet gas flow through the gas treating section, the 1" pressure equalizing valve around the plant inlet shut- down valve U P-2001-204A is slowly opened to pressurize the plant inlet header, and gas treating area and the plant outgoing header 12" P-2004-204A. V ders are pressurized, the gas treating area section emergency shutdown-system can be activated so the plant inlet shutdown valve UV-01 ned.

.4 Dry Out of Feed Gas Lines through Cores

Exchangers E-102 K-A, Band C. The dry out of feed gas to core exchangers can be incorporated while drying of the high pressure ar ssure refrigerant side if sufficient dry gas is available. Introduce dry gas to 6" P-1102-204A from D-102A, B or C and purge through E-10: ıd C feed gas side and out through 2" P-1311-204K wet feed derime gas. Open low point drains and high point vents, and check with mois ılyzer using same procedure as on refrigerant sides.

rigerant Loop Dry Out

The dry out of the liquefaction system is achieved by purging the loop and associated piping with dry natural gas.

All low point and high point drains must be purged till dry and all dead lines must be dried as well as the circulating system.

There are essentially three ways to achieve dry out; these are listed in the order of effectiveness:

Intermittent purge without the compressor in operation. The system is pressured to 50 psig with natural gas then vented ɔugh all drain and vent points.

Intermittent purge while circulating refrigerant. With the compressor operating dry methane is fed into the loop to raise the discharge pres psi. The loop is then de-pressured a corresponding amount.

Continuous purge while the compressor is operating. The loop is pressured with dry feed gas which is allowed to ıtinuously bleed off or return to the pipeline.

The third method could be used more efficiently if the compressor did not have to be operating in order to regenerate the molecular ls. However, this method is ideal when a pre-liquefaction start up dry out is required as it allows the sieves to be commissioned and requir e attention.

nts to note concerning dry out:

During the dry out of the refrigerant system all low points and vents should be maintained and the moisture content logged. It is possible t :kets of moisture in the system and a log of the moisture levels will indicate the locality of the pocket and the effectiveness of the dry out.

A typical dry out would show initial water levels 100-1000 ppmv. As the system is dried the purge gas moisture level will fairly rapidly fall t nv. This indicates an unacceptable moisture content. The moisture level might stay at 20-40 ppmv for some time before reducing further ir dry out of a pocket of moisture. When the system is dry the purge gas moisture content will rapidly fall to less than 10 ppmv. Levels of 5- acceptable for dry out.

ı drying out the loop be sure to dry out all of the refrigerant loading lines and sweep gas system. This is best done by circulating dry g ..ttent purging.

Key points to measure the purge gas moisture content are as follows:

1. Bottom of Suction Drum D-14
2. Bottom of Discharge Separator D-105
3. H.P.R. Pump P-10B bottom vent
4. Refrigerant exchanger pressure drops on High and Low pressure side of cone at cold end
5. Light and vent on cold end separator D-110

Note- initially the J.T. valve should be closed and the refrigerant loop should be extensively purged with dry gas ore allowing gas to flow through the exchangers. This minimizes the possibility of transferring moisture into the exchangers.

Initial Start-Up to Flush System with Circulating Refrigerant

At the initial start-up of the liquefaction section, all vessels id and piping must be cleaned to remove solid particles of rust, dirt, and ıstruction material that have been deposited during installation. This is most effectively carried out by operating the loop with a refrigerant id particles picked up by the circulating refrigerant are deposited in the strainers installed for this purpose and the operation provides a use ication of any possible problems that might occur during liquefaction start-up.

It is necessary to circulate a refrigerant mixture rather than just methane or nitrogen in order to obtain refrigerant liquefaction in the :hanger, and a refrigerant liquid flow from the discharge separator.

: circulating refrigerant mixture is mostly methane, iso-butane, and iso-pentane. If a complete cooldown to liquefaction temperatures is req be necessary to add the other refrigerant components.

cedure

Carry out Dry-Out Procedure to insure that all refrigerant and feed systems are ready for liquefaction start-up.

ʼurize the loop to 100 PSIG with dry feed gas.

Load iso-butane and iso-pentane into the Discharge Separator D-105.

iso-butane -600 pounds (approximately)
iso-pentane -600 pounds (approximately)

s will provide sufficient level to operate the refrigerant pump.

2" minimum flow

:nsure that discharge separator contains sufficient liquid level, and start pump.

Reset pump shutdown to automatic.

' iso-butane and iso-pentane to refrigerant Suction Drum D-104.

iso-butane -400 pounds (approximately)
iso-pentane -400 pounds (approximately)

:e any increase in level in D-105.

Compressor discharge flow should be held at 7.5 to 8.0 roots of flow by manually adjusting the anti-surge controller, FRC-03.

Slowly open FV-18 by manually operating FIC-118 until a minimum flow is observed. This should be less than 1.0 root of indicated flow.

Observe the level in D-105. If this level continues to fall prepare to close FIC-118 and add more liquid iso-pentane.

Increase liquid flow by opening FV-18 until a liquid level appears in D-104. Allow the refrigerant to circulate for at least 8 hours.

Switch P-108 HPR Liquid Pump shutdown to bypass.

Shut down P-108 and open pump bypass. Slowly close PDIC-70 in 12" RF-1207 to force liquid to core. Increase liquid flow until 2-phase flow urs. This will help to clean liquid line 4"RF-1208.

When flushing is considered complete carry out procedure for removal of strainers.

Removal of Strainers

er completing the refrigerant flushing procedure the fine strainers should be removed before commencing the liquefaction start-up. The strair removed are as follows:

HPR Liquid Pump Suction, 1 strainer
Remove 40-mesh strainer from basket support and replace basket. 4"RF-1250.

HPR liquid to core, 3 strainers
Remove 80-mesh strainer from basket support and replace basket, 3 lines from 4" RF-1351.

vapor to core, 1 strainer
Remove strainer and basket, 12"RF-1352

Cold LPR to core, 4 strainers

E-102K-A	4"(6")RF-1355
E-102K-B	4" (6")RF-1357
	4"RF-1359
E-102K-C	4" (6") RF-1361

Remove complete strainer and basket. In order to remove the strainers from the cold end of the exchanger, it is necessary to remove a iid from the system. As this will require the hot gas deriming lines to be used, it is necessary to carry out the removal of the liquid while the npressor is operating to provide till heat for the hot derime gas. This should be carried out as follows:

Check TIC-32 is closed.

Set TIC-33 to 50°F or 10°F below ambient, whichever is the lower, after checking the controller operation and valve movement.

Open 3" hot gas block valve in 3" P-1106.

Check that 3" block valve in dehydrator start-up bypass is closed.

pen 3" block valve to process vent in line 3" P-1112.

Check that 3" block valve in 3" P-1112 is closed.

Check that 4" block valve downstream of F-101 in line 6" P-1102 is closed.

Check that 1" flush connection valve in wet feed derime line 2" P-1311 is closed.

Open 2" block valve in 2" P-1311.

k that v laves at P-108, P-110, and P-112 are closed.

Open valves to temporary purge lines in cold HPR liquid P-107, P-109, and P-111.

Close HPR liquid valve FV-18 and allow liquid to accumulate in D-105.

Stop flow of refrigerant through core by slowly closing HIC-102 Land opening anti-surge valve FRC-O3 to maintain flow through compressor.

Close the 2" and 1" valves in the derime gas line 2" P-1311.

Close the vent connection at pressure taps P-108, P-110, and P-112.

Shut down compressor by pushing stop button on control panel. At the same time, open anti-surge valve FV-03 fully to allow pressures to ..."ze.

..epressurize plant to vent stack by opening 2" valve in wet refrigerant derime gas line 2" P-1224.

Purge system with N_2 by pressuring and de-pressuring until satisfied that vapor in the loop is below the flammability level. The strainers ca removed.

Liquefaction Start-Up

ore commencing the liquefaction start-up, the following should be completed:

The feed gas treating system is to be fully operational and performing satisfactorily.

Refrigerant loop dry-out is to have been completed.

Refrigerant flushing operation and removal of screens is to have been completed.

All critical control systems must be fully checked out and operational.

All refrigerants, feed gas, and other utilities required for operation must be available.

The liquefaction start-up incorporates checking HPR liquids pump, compressor start-up, refrigerant loading, introduction of feed gas, a ıming refrigerant composition to establish production conditions.

Initially, the compressor will circulate dry methane with the anti- surge valve FV-03 almost fully open, with the JT valves fully open. A igerant is loaded into the loop, the molecular weight will increase and the compressor will be able to circulate more vapor. The anti-surge v. ıuld be gradually closed to maintain a flow of approximately 7.5 roots of flow on FRC-03. At some point in the cooldown, the anti-surge valv y closed. The controller set point should be set to 6.0 roots of flow and FRC-03 should be placed on automatic.

Check out plant and pressurize with dry gas to 100 PSIG as per Compressor Start-Up Procedure. D-110 should be bypassed at this time by c butterfly valves around the vessel.

iso-butane and iso-pentane into Discharge Separator D-105 and check level on indicator LI-04.

iso-butane -600 pounds (approximately)
iso-pentane -800 pounds (approximately)

Close FV-18 and open block valves for pump operation. Start pump on recycle to check operation.

Shut down HPR liquid pump and set shutdown bypass to "Automatic Shutdown."

Check that feed gas block valves are open to the exchanger E-102K land down to the LNG storage tank. FRC-01 should remain closed.

Start Compressor as per Compressor Start-up Procedure.

Check that inlet guide vanes are open and that all compression stages show an increase in pressure.

Open 2-inch hot gas bypass valves to D-104.

Slowly open the JT valves (HIC-102) to 100% open to allow methane to circulate through the cores.

Load 60 bottles of ethylene. Loading ethylene is a lengthy procedure and continues throughout the loading operation. ›roximately 90 bottles will be required.

Load 600 pounds propane to the suction drum, 600 pounds iso-butane, and 600 pounds iso-pentane by charging one or two bottles of each ıponent in turn. Observe liquid accumulation in 0-105.

Crack open HPR liquid valve FV-18 by manually operating FIC-118 until an indication of flow is registered on recorder FR-18. s flow should be less than 2 roots of flow.

The cold end temperature should start to fall and the level in D-105 should fall to a stable point. At the same time, the tion and discharge pressure should start to fall, indicating condensation of vapors in the exchanger. With the circulating ture, it should be possible to obtain temperatures in the region of -150°F.

:fully note the liquid level in D-105. If this falls too rapidly on liquid accumulation in D-104, close the liquid valve ıC-118 and allow liquid to start to build up again. Reopen the liquid valve to a lower flow setting.

Switch FIC-118 to automatic. The liquid level in D-105 should be stable, and the cold end of the exchanger operating at ›roximately -150°F to -170°F.

Slowly load in approximately 400 pounds of nitrogen. This will increase the system pressure momentarily before the cooling ect causes a decrease in cold end temperature and associated decrease in pressure.

Add 200 pounds propane, 200 pounds iso-butane, and 200 pounds iso-pentane to suction drum D-104.

Turn off hot gas bypass to D-104 and note liquid level.

Increase HPR liquid flow slowly until liquid starts to accumulate in the suction drum D-104, or D-105 level is too low.

ⁿ⁻crease LNG flow to maintain LNG temperature at approximately -250°F.

‿ample refrigerant to check composition. It should be necessary to add methane, ethylene, and nitrogen at this stage. Liquids, iso-butane ıtane, need only be added if there is insufficient level in the discharge separator. If more liquid is required in the discharge separator, add ›roximately 200 pounds propane, 400 pounds iso-butane, and 500 pounds iso-pentane.

To trim the composition and increase the system pressure, add nitrogen, methane, and ethylene in small increments as follows:

a. Nitrogen -Crack open nitrogen loading valve to permit small flow. Do not add nitrogen first when timing composition. Allow suction pressure to rise by 1/2 to 1 PSI, then close valve. Allow the effect to be observed before adding more nitrogen.

b. Methane -Crack open methane loading valve to permit small flow. Allow suction pressure to rise 1 to 2 PSI as observed on PR-10, tl close valve.

c. Ethylene -Add ethylene in increments of 3 bottles at a time. Allow the bottles to depressurize slowly.

Increase feed gas rate to maintain LNG temperature at approximately -250°F. HPR liquid flow should be reset to maintain the maximum liq hout accumulation in D-104. Refrigerant loading should continue until compressor discharge pressure reaches 295 PSIG.

Once the bulk refrigerant loading has been completed, the HPR liquid flow controller FIC-118 can be switched to remote set point and contr v from the differential temperature between the HPR into the core and the LPR returning to the compressor. Care should be taken with this ıtroller, as the proportional band and reset settings have to be established.

Liquefaction Restart After Cooldown

This restart procedure is for the event of a liquefaction shutdown during normal liquefaction or after cooldown has been achieved.

Having checked out all systems and reset all shutdown signals the compressor is started on total by-pass with the JT valves closed. Th ₹ liquid valve FV-18 is closed and the refrigerant liquid pump started. The JT valves are slowly opened to obtain flow through the exchanger. ın as flow is established through the cores start a small flow of warm HPR liquid to promote cooldown. As soon as the exchanger starts to co ɔugh -200% which is observed from the cold end temperatures and system pressure the feed gas should be started.

Refrigerant flow and feed gas can then be simultaneously adjusted until the plant returns to its original operating condition.

cedure should be as follows:

-ocate cause of shutdown and correct the cause.

₹eset all lock outs and open UV-01 if the shutdown was in the 1-1 system.

Check in the control room that anti-surge valve is fully open and on manual.

Check that JT valves are on manual and that H.IC-102 is closed.

Check that FRC-01 is on manual and closed.

₹educe the control board turbine speed controller to 10 psi.

Check that a cooling water fan and pump are running.

Check that the HPR liquid pump is on automatic shutdown. Check level in D-105.

ᴾhysically check the position of anti-surge valve FV-03 (open) and JT valves (closed).

Open up turbine expander gas valve and reset turbine.

Reset the turbine control panel to manual and crank.

Reset the York panel and oil pump and push the York panel start button. After approximately 10-15 seconds the solenoid will energize audit

Go to the turbine control panel and check for the green ready light.

If the light is on, manually open the expansion gas trip valve to the expander.

o the turbine control panel and wait for the "ready to fire" lights to come on.

When the "ready to fire" lights appear move the control to "fire."

Allow the H.P. turbine speed to increase through 2800 RPM before turning the control to "accelerate." The turbine speed increase through 5400 before the LP governor takes over.

When the H.P. turbine speed reaches 5400 or levels off, switch the control from accelerate to run.

Start refrigerant liquid pump, if D-105 liquid level is satisfactory. If level is too low, open pump bypass and do not start pump.

Slowly and continuously open HIC-102 until not less than 5 roots of flow are registering on the recorders FR-101 A, B, C, and indicator FI-

This should be done while simultaneously closing FRC-03 to maintain approximately 7.5 roots of compressor discharge flow. If this is not some reason, close FRC-03 to reduce the flow after the flow through the cone is fully established.
Once the J.T. valves are starting to open do not stop or ascillate the valve position as this will disrupt and possible prevent the cool dow

soon as a vapor flow has been established to the exchanger slowly open the HPR liquid valve to give 1 to 2 roots of flow. the flow of refrigerant starts through the exchanger liquid will accumulate in the discharge separator and it is essential to start the liquid flc n as possible in order to achieve cool down.

If P-108 is not operating due to low liquid level, open FV-18 manually and gradually close PDIC-70 to force liquid flow.

Immediately after the liquid flow has been started the system pressure indicated by the compressor suction and discharge pressures will s indicating cooling.

At this time as the cold end of the exchanger falls below -200°F open the feed gas valve to 1 to 2 roots of flow.

As soon as the feed flow is established set the controller and switch to automatic.

Continue to maintain the refrigerant flow at approximately 7.5 roots by adjusting FRC-03. Either shortly before or shortly after the feed is oduced it will be possible to completely close the anti-surge valve. At this time the set point should be at 6.0 roots and the instrument swit omatic.

Slowly increase the turbine speed to the required running speed and adjust the J.T. valves HIC-102 to the required refrigerant v.

Continue to increase the feed rate, HPR liquid flow and total refrigerant flow until the pre-shutdown conditions are re-established.

If the plant has been restarted without the use of the HPR liquids pump, establish a liquid level in D-105 and start pump with discharc sed, pump on minimum flow.

Gradually open discharge block valve and throttle FV-18.

When block valve is fully open, start opening PDIC-70. FV-18 will have to be opened at the same time to maintain flow.

8. NORMAL SHUTDOWN PROCEDURE

eral

Plant operation consists of three modes of operation which are Feed Gas Treating and Liquefaction, Vaporization, and LNG Tank Holdin mal operation, each operation can be individually shut down or started without effecting the other. This section of the manual describes shu he areas either of temporary shutdown or seasonal shutdown.

Feed Gas Treating and Liquefaction

Normal shutdown of the feed gas treating and liquefaction areas is achieved in the following manner:

Push panel mounted gas treating and liquefaction area shutdown button on central control panel. This will initiate the gas treating and liquef a shutdown system and perform the following as indicated on Logic Diagram A12.

a. Shutdown turbine and start auxiliary oil pump which will run on a timed basis to protect the turbine.
b. Shut down the compressor.
c. Close plant inlet shutdown valve, UV-01.
d. Stop dehydrator cycle timer, KC-01.
e. Stop Regeneration Gas Cooler, E-101.

For planned seasonal shutdown, the following additional functions need to be performed:

a. Shutdown and drain cooling water system.
b. Close turbine fuel and starting gas block valves.
c. Close refrigerant compressor C-101C inlet and discharge block valves and blowdown compressor.
d. Refer to manufacturer's instruction manual and prepare equipment for shutdown period, i.e. , start sump heater, etc.

Vaporization

mal shutdown of vaporizers is performed as follows:

1. Place flow controller to minimum flow position.
2. Close 4" vaporizer inlet fuel block valve.
3. Push stop button on vaporizer local burner start-stop control panel. This will automatically close vaporizer inlet and outlet valves.

seasonal shutdown, prepare vaporizer for shutdown per manufacturer's recommendations.

LNG Tank Holding

The LNG tank holding effects only the boil-off compressor, C-102. This equipment is shut down only for repairs or oil changes. The loc. urnished with a shutdown button. Refer to manufacturer's instruction manual for shutdown of the unit.

Operational- Operational function which will initiate the shutdown system is loss of instrument air pressure.

Fire Detection -The plant is equipped with a fire sensory loop which when triggered will activate the emergency shutdown system.

The emergency shutdown system operates on 125 volt power. This provides a positive shutdown system unaffected by momentary p
es or drops.

Power Outage

The plant is provided with an emergency generator to prevent the plant from shutting down due to power outages. The electrical dist
tem has been designed so that on power outages, the emergency generator can carry the feed gas treating and liquefaction load or during
orization the LNG vaporizer pumps and the vaporizers. The boil-off compressor load will not be covered by the emergency generator durin
ages.

An emergency shutdown will not kill power to the plant lighting system.

Equipment Failure

Major pieces of equipment are furnished with self-contained protective shutdown systems to protect the equipment. The following equ
be furnished with self-contained protective systems.

n No.	Description
.01T	Refrigerant Compressor Turbine Driver
.01C	Refrigerant Compressor
.02	Boil-Off Compressor
.03	Instrument Air Compressor
.02A, B&C	Vaporizers
01	Regenerator Gas Cooler Fan
-101	Cooling Tower Fans
04	H.P. Liquid Refrigerant Pump

nufacturer's literature will describe protective systems.

Fire

The plant is equipped with a pneumatic fire detection system consisting of fusible plugs located as shown on Drawing A1-1F. The system
ed will bleed down and in turn, by means of pressure switch PSL-37, alarm and initiate a plant shutdown.

Dry chemical agents are the only effective means of extinguishing LNG fires. The plant is equipped with dry chemical extinguishing equ
shown on Drawing A1-1F.

Attachment I:

List of Emergency Shutdown Buttons

15.0 EMERGENCY SHUTDOWN BUTTONS

INSIDE CONTROL ROOM:

1. PLANT SHUTDOWN HS-05 -Shuts down turbine, vaporizers, LNG pumps, boil-off compressor, York compressor, inlet gas valve, storage tank-105 outlet valve, cooling tower fans and pumps, refrigerant pump, regeneration gas system, Taylor timer, Regen gas cooler.

2. STORAGE TANK SHUTOFF HS-07 -Shuts off LNG exit from ST-105, will cause vaporizers to trip also.

3. TURBINE STOP HS-04 -Shuts down turbine, York compressor, inlet gas valve, refrigerant pump, Taylor timer.

OUTSIDE CONTROL ROOM:

1. HS-10 -At truck loading station stops LNG flow to truck by closing UV-30.

2. HS-12 -At truck loading station shuts down vaporizers, LNG pumps and boil off compressor.

3. PLANT SHUTDOWN HS-08 -Northeast of scale shuts down turbine, vaporizers, LNG pumps, boil-off compressor, York compressor, inlet gas valve, storage tank -105, outlet valve, cooling tower fans and pumps, refrigerant pump, regeneration gas system, Taylor timer, Regen gas cooler.

4. REFRIGERANT PUMP P-108 -At South end of discharge separator, stop button will stop turbine, York compressor, inlet gas valve, Taylor timer, Regen gas system, refrigerant pump.

5. BOIL-OFF COMPRESSOR -Button on local panel will stop boil-off compressor.

6. TURBINE PANEL TRIP -Hydraulic Oil Dump Valve inside facing front door stops turbine, York compressor, refrigerant pump, inlet gas valve, Taylor timer.

7. YORK PANEL STOP -On South side of York compressor stops turbine, inlet gas valve, refrigerant pump, Taylor timer, York Compressor.

8. LNG PUMP STOP -One button for each of the three pumps on South side of pumps stops them, stops vaporizers due to minimum flow high temperature trip.

9. TURBINE PANEL STOP -Button on front panel outside will stop turbine, York compressor, inlet gas valve, refrigerant pump, Taylor timer, Regen gas system.

16.0 VALVES CLOSED IN EVENT OF EMERGENCY

RED VALVES: CLOSE

1. FUEL GAS TO TURBINE -South side of turbine stops turbine, York compressor, refrigerant pump, inlet gas valve, Regen gas system, Taylor timer.

2. FUEL GAS TO VAPORIZERS -One valve to each vaporizer on south side shuts vaporizer down.

3. SOLENOID VALVE UV-01 -Stops inlet feed gas, turbine, York compressor, refrigerant pump, Regen gas.

4. SOLENOID VALVE UV-07 -Stops LNG flow out of storage tank and stops vaporizers.

5. BOIL-OFF OUTLET -Stops B.O. compressor with low suction.

6. INSTRUMENT GAS -Next to UV-01 stops gas to controllers and shuts down turbine, York compressor, refrigerant pump, inlet Regen gas system, gas valve, Taylor timer.

7. FEED GAS FILTER F-101 -Block valve downstream of F-101 stops flow through liquefaction section.

8. INLET GAS -At metering station stops flow into plant, turbine, York compressor, refrigerant pump, Regen gas syste, Taylor timer.

9. OUTLET GAS -At metering station stops flow out of plant, vaporizers, boil-off compressors.

10. STORAGE TANK INLETS -Three valves cut off flow of LNG into ST-105.

GREEN VALVES: OPEN

1. EMERGENCY VENT VALVES -HIC-01 PNEUMATIC VALVE -Behind CO_2 building on methane line.

2. F-101 EXIT VALVE -North end of F-101 lets methane go to flare stack or outlet line.

ORANGE/GREEN VALVES -EMERGENCY VENT VALVES -OPEN -

1. REFRIGERANT SWEEP LINE -Four valves vent to flare stack.

2. HIGH PRESSURE REFRIGERANT DISCHARGE LINE -Four valves vent to flare stack. To depressurize complete refrigerant system, the following valves must be open: 24" suction valve, PDIC -70 valve, JT valves, 14" compressor discharge.

Attachment J:

List of Valves Closed in Case of an Emergency

ATLANTA GAS LIGHT COMPANY
CHATTANOOGA LNG PLANT

EMERGENCY PROCEDURES

In the event of a major leak of vapor from the refrigerant system that cannot be easily stopped:

1. Shutdown the Refrigerant Compressor.

2. Call Chris Young, Gary Northrup or back up Operator.

3. Close all valves in loop to isolate leak.
   (DO NOT WALK THROUGH VAPOR TO WORK)

   a. Close Anti-Surge valve in Control Room.
   b. Close FV 118 Ref. Liq. Valve in Control Room.
   c. Close JT Valves.
   d. Close 24" and 8" Butterflies to Comp. Suction.
   e. Close 12" Butterfly and Ref. Vapor Line by PDIC 70.
   f. Close 14" Butterfly in Compressor Discharge.

4. Vent isolated section to flare header through nearest available vent line.

This procedure will vent the part of the loop associated with the leak as fast as possible and minimize the quantity of refrigerant vented through the leak.

Revised 5/19/2000 DC

ATLANTA GAS LIGHT COMPANY
CHATTANOOGA LNG PLANT

SAFETY SECTION

FIRE IN SPECIFIC AREAS

1. Leak and Fire on flange to a Vaporizer.

a. Depress nearest I-1 Shutdown.
b. Notify Chattanooga Fire Department and Police by dialing 911.
c. Notify Chris Young and Gary Northrup.
d. Direct appropriate fire monitors on surrounding equipment to keep cool.
DO NOT ATTEMPT to EXTINGUISH! DO NOT PUT WATER ON LNG!!
e. Isolate leak.
f. After leak is stopped, extinguish remaining fire with dry chemical.

2. Flange leak with fire in Dehydrator area.

a. Depress nearest I-1 Shutdown.
b. Notify Chattanooga Fire Department and Police by dialing 911.
c. Notify Chris Young and Gary Northrup.
d. Isolate leak if possible.
e. After leak is stopped, extinguish any remaining fire with dry chemical.

3. After leak is stopped, extinguish any remaining fire with dry chemical.

a. Depress nearest I-1 Shutdown.
b. Notify Chattanooga Fire Department and Police by dialing 911.
c. Direct appropriate fire monitors on surrounding equipment to keep cool.
d. Isolate leak if possible.
e. Make determination if refrigerant loop should be vented to flare stack.
f. Block off Methane feed at feed filter.
g. After leak has been stopped, extinguish any remaining fire with dry chemical.

4. Refrigerant leak and fire between Turbine and Condenser.

a. Depress nearest I-1 Shutdown.
b. Notify Chattanooga Fire Department and Police by dialing 911.
c. Direct appropriate fire monitors on surrounding piping and equipment.
d. Isolate leak if possible and vent affected section.
e. Determine if remaining refrigerant loop should be vented, vent if necessary.
f. After leak has been stopped, extinguish remaining fire with dry chemical or water.

5. Electrical Fire at P-108.

a. Depress nearest I-1 Shutdown.
b. Notify Chattanooga Fire Department and Police by dialing 911.
c. Turn OFF breaker to P-108.
d. Direct appropriate fire monitors on surrounding equipment.
e. Extinguish with dry chemical or CO2.

6. Oil leak with Fire Inside Turbine Building.

a. Depress nearest I-1 Shutdown.
b. Notify Chattanooga Fire Department and Police by dialing 911.
c. Block off Fuel Gas.
d. Turn both AC and DC breakers off to Turbine.
e. Direct fire monitor on outside of building <u>but not on leak or fire.</u>
f. Extinguish fire with dry chemical.

7. Fire on or in Cooling Tower.

a. Depress nearest I-1 Shutdown.
b. Notify Chattanooga Fire Department and Police by dialing 911.
c. Turn breakers off to Cooling Tower fans.
d. Direct fire monitors on Cooling Tower Pumps.
e. Turn off breakers to Cooling Tower Pumps.
f. Isolate refrigerant loop in sections.
g. Determine if there is refrigerant leak into cooling water.
h. Vent section of refrigerant loop leaking to vent header.
i. Extinguish fire in wood part of tower with water.
j. Allow any refrigerant leak to burn and keep surrounding area wet.

Do not drain water line, this would allow air to get into line and cause an explosive situation.

8. Electrical Fire at the Boil-Off Compressor

a. Depress nearest I-1 Shutdown.
b. Notify Chattanooga Fire Department and Police by dialing 911.
c. Turn all electrical breakers off to Boil-off area.
d. Extinguish any remaining fire with water, dry chemical or CO2.

9. Oil Fire at Boil-Off Area.

a. Depress nearest I-1 Shutdown.
b. Notify Chattanooga Fire Department and Police by dialing 911.
c. Turn all electrical breakers off to Boil-Off Compressor.
d. Block off boil-off suction if possible.
e. When Fire Department arrives, cool sides of LNG Tank and any affected piping.
f. Extinguish fire.

10. Flange or Broken Line Leak with fire at Boil-off Compressor.

a. Depress nearest I-1 Shutdown.
b. Notify Chattanooga Fire Department and Police by dialing 911.
c. Turn electrical breaker off to Boil-off.
d. When Fire Department arrives, cool sides of LNG Tank and surrounding piping.
e. Block off Boil-off suction.
f. Block off downstream of leak or break.
g. DO NOT EXTINGUISH, allow to burn out while keeping surrounding area cool.

11. LNG Leak and Fire at LNG Tank.

a. Depress nearest I-1 Shutdown.
b. Notify Chattanooga Fire Department and Police by dialing 911.
c. Turn off electrical breakers to Boil-off LNG Pumps.
d. When Fire Department arrives, direct water on sides of Tank and piping.
DO NOT PUT WATER ON LNG.
e. Block all penetration valves if possible.
f. If high expansion foam is available, cover spill and fire with foam and move spill away from container.
g. After leak has been stopped, keep Tank, lines and equipment cool while determination is made to extinguish fire or not.

12. Electrical fire in Motor Control Center. (MMC)

a. Depress nearest I-1 Shutdown.
b. Notify Chattanooga Fire Department and Police by dialing 911.
c. If possible, throw the Main breaker.
d. Use CO2 if available to extinguish fire. If CO2 is not available, use dry chemical.

13. Fire at Transformers.

a. Depress nearest I-1 Shutdown.
b. Notify Chattanooga Fire Department and Police by dialing 911.
c. Call the Electric Power Board to the effect of the fire;
Ask for disconnection at North Hawthorne Street.
d. Direct fire monitor on building to keep cool.
e. Extinguish fire with dry chemical.

14. Fire in Storage Building.

a. Notify Chattanooga Fire Department and Police by dialing 911.
b. Turn electrical power off to buildings.
c. Direct fire monitors onto buildings.
d. Extinguish with dry chemical and then soak with water.
e. If needed, Shut Plant down.

15. Leak with fire at Meter Station.

a. Depress nearest I-1 Shutdown.
b. Notify Chattanooga Fire Department and Police by dialing 911.
c. Block off our outgoing and incoming lines at driveway east of the plant.
d. Allow leak to burn, cooling piping with Fire Departments water.
e. CGC will close valve appropriate to these lines.
f. Allow leak to burn out and protect surrounding facilities and objects.

ATLANTA GAS LIGHT COMPANY
CHATTANOOGA LNG PLANT

IN CASE OF EMERGENCY

1. CALL DISPATCHER...423-892-7220

2.ASK DISPATCHER TO INFORM:

LNG Plant Supervisor: Chris Young

Office: 423-624-4843
Cell: 770-315-5208
Pager: 404-776-0954
Home: 423-876-7464

LNG Technology Manager: Gary Northrup

Office: 770-479-2125 Ext. 202
Cell: 770-856-2125
Pager: 404-776-0950
Home: 770-924-2543

Director of LNG Operations: Richard Rogers

Office: 770-479-2125 Ext. 201
Cell: 404-275-9484
Pager: 404-776-0969
Home: 770-345-7022

ATLANTA GAS LIGHT COMPANY
CHATTANOOGA LNG PLANT

PLANT CALL LIST:

<u>LNG Plant Supervisor:</u> Chris Young

Office: 423-624-4843
Cell: 770-315-5208
Pager: 404-776-0954
Home: 423-876-7464

<u>LNG Technology Manager:</u> Gary Northrup

Office: 770-479-2125 Ext. 202
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Pager: 404-776-0950
Home: 770-924-2543

<u>Director of LNG Operations:</u> Richard Rogers

Office: 770-479-2125 Ext. 201
Cell: 404-275-9484
Pager: 404-776-0969
Home: 770-345-7022

<u>LNG Plant Operators:</u>

Robert McCain
Office: 423-624-4843 Home: 706-866-4687

Norman Jernigan
Office: 423-624-4843 Home: 423-629-6123 (Private)

Terry Poss
Office: 423-624-4843 Home: 423-867-7855

Riverdale LNG Plant Control Room	770-478-2442	Ext. 412	Location 1300
Cherokee LNG Plant Control Room	770-479-2125	Ext. 312	Location 1320
Macon LNG Plant Control Room	912-746-1601	Ext. 512	Location 1328

Attachment K:

Chattanooga LNG Plant Safety and Emergency Procedures Manual

ATLANTA GAS LIGHT COMPANY
CHATTANOOGA LNG PLANT

SAFETY AND EMERGENCY PROCEDURES MANUAL

Atlanta Gas Light Company
Chattanooga LNG Plant
3401 N. Hawthorne St.
Chattanooga, TN 37406
Telephone (423) 624-4843
FAX (423) 629-1893

LNG DEMONSTRATION

December 14, 2000

Chris Young, Gary Northrup, Ben Ward gave LNG demonstration to the Hamilton County and Chattanooga Haz-Mat Response Teams.

COPIES OF EMERGENCY MANUAL GIVEN TO THE FOLLOWING

Danny Free
Bruce Jones
AGLC Gas Control
Chattanooga LNG Plant

SAFETY & EMERGENCY PROCEDURES MANUAL

CHATTANOOGA LNG PLANT

PLANT EMERGENCY COMMUNICATIONS

The LNG Plant Emergency Communication system consist of two radio systems.

The IN-Plant radio system is used for IN-Plant communication between the control room and the field. This system consists of four mobile units and one base unit, located in the control room.

CONTINGENCY PLANS

INDEX

1.0 CONTRACTORS

CHATTANOOGA GAS COMPANY

CONTRACTORS

(Can Be Used In Case Of An Emergency)

Hiwassee Construction Company, Inc.
Mr. S.D. Newman
996 County Road 20 Home Phone 423-336-2271
Calhoun, Tennessee Home Phone 423-336-2314 (fax & voice)
Mobile Phone 423-667-0764

Heath Consultants, Inc.
9030 Monroe Road
Houston, TX 77061

Heath Consultants, Inc. Mr. Jim Davis
5950 E. Shallowford Road
Chattanooga, TN 37421
Office Phone 423-499-4477 Same Number After Hours Leave Message

Flint Construction Company
Post Office Box 723
Lawrenceville, Georgia 30246
Mr. Ross Eberhardt
Office Phone 423-891-2702
Pager Number 423- 752-8832
H ome Phone 423-375-92232

Flint Construction- Tennessee Division
P.O.Box 31378 1-423-388-3451
Knoxville, TN 37398
Allen Brown

-

INTERIM MANAGER

Larry Buie

2.0 FIRE IN PROCESS AREA

1. DEPRESS Nearest accessible EMERGENCY SHUTDOWN BUTTON.
2. NOTIFY FIRE DEPARTMENT AT 911 OR BY WAY OF FIRST ALERT 'A' BUTTON.
3. NOTIFY AGL CENTRAL BY TELEPHONE AT 1-404-584-4477 OR BY CGC RADIOS.
4. Make sure FLARE PILOT is burning.
5. OPEN GREEN VALVES AND GREEN/ORANGE VALVES, CLOSE RED VALVES.
    1. VENT refrigeration system to flare.
       OPEN GREEN/ORANGE VALVES.
    2. CLOSE natural gas inlet and outlet block valves.
       CLOSE RED VALVES and VENT natural gas headers.
       OPEN GREEN VALVES.
    3. CLOSE boiler fuel gas valves - CLOSE RED VALVES.
    4. CLOSE all block valves to LNG STORAGE TANK.
       CLOSE RED VALVES

1. COOL affected equipment with water.
2. Attempt to EXTINGUISH FIRE.
3. RESIDENTIAL ALARM must be sounded in the event that the fire is endangering the LNG STORAGE TANK.

3.0 BRUSH FIRE AWAY FROM PROCESS AREA

1. DEPRESS nearest EMERGENCY SHUTDOWN BUTTON.

2. NOTIFY FIRE DEPARTMENT AT 911 OR BY WAY OF FIRST ALERT 'A' BUTTON.

3. NOTIFY AGL CENTRAL BY TELEPHONE 1-404-584-4477 OR BY CGC RADIOS.

4. Attempt to EXTINGUISH FIRE.

5. If, FIRE CANNOT BE CONTROLLED, follow procedure under "FIRE IN PROCESS AREA " starting with Step 4.

6. RESIDENTIAL ALARM must be sounded in the event that the fire is endangering the LNG STORAGE TANK.

4.0 LNG SPILL

1. DEPRESS nearest accessible EMERGENCY SHUTDOWN BUTTON.
2. NOTIFY FIRE DEPARTMENT AT 911 OR BY WAY OF FIRST ALERT 'A' BUTTON.
3. NOTIFY AGL CENTRAL BY TELEPBONE AT 1-404-584-4477 OR BY CGC RADIOS.
4. SOUND RESIDENTIAL ALARM.
5. Make sure FLARE PILOT IS EXTINGUISHED.
6. CLOSE RED VALVES, OPEN GREEN VALVES.
   CLOSE natural gas inlet and outlet block valves.
   CLOSE RED VALVES and vent natural gas headers.
   OPEN GREEN VALVES.
7. CLOSE all block valves to LNG STORAGE TANK.
   CLOSE RED VALVES.

5.0 VAPOR LEAK FROM REFRIGERANT SYSTEM

In the event of a major leak from the refrigerant system that cannot be easily stopped:

1. SHUTDOWN REFRIGERANT COMPRESSOR
2. Call Chris Young and Ben Ward.
3. Close all valves in loop to isolate leak- DO NOT WALK THROUGH VAPOR!
   a. Close anti-surge valve in control room.
   2. Close FV 118 Ref. Liq. Valve in control room.
   3. Close JT Valves.
   4. Close 24" and 8" butterflies to compressor suction.
   5. Close 12" butterfly and refrigerant vapor valve by PDIC 70.
   6. Close 14" butterfly valve in compressor discharge.
4. Vent isolated section to flare header through nearest available vent line.

This procedure will vent the part of the loop associated with the leak as fast as possible and minimize the quantity of refrigerant vented through the leak.

6.0 INJURY TO PERSONNEL

1. Request Ambulance, Dial 911

2. Notify Chris Young and inform as to type and severity of injury.

3. Administer First Aid in cases of stopped breathing, shock, severe bleeding and minor burns. Qualified medical personnel should attend to other injuries.

7.0 KEY PERSONNEL IN NOTIFICATION PROCEDURE

METER/REGULATOR REPAIRMEN

Lee Bradford, Box 79, Highway 60, Birchwood, TN 37308 476-7221
William Kesley, 3917 Pattentown Road, Ooltewah, Tn 37363 892-6653
Dewayne Price, 8523 Maplewood Trail, Ooltewah, TN 37363 855-5043
Ollie Womack, 310 Spring Street, Rossville, GA 30741 706-866-3210

TELEMETRY

Kim Gregory, 145 Benton Station Road, Benton, TN 37307 338-8549

STOREROOM

Lorne Buck, 7621 Cove Ridge Road, Hixson, TN 37343 842-8524

SERVICE SUPERVISOR

Bruce Jones, 6220 Shallowford Rd. #268, Chattanooga, TN 37421 855-1367

SERVICEMEN

Kelly Atkins, P.O. Box 879, Soddy Daisy, TN 37379 332-0370
David Bacastow, 1624 Keeble Street, East Ridge, TN 37412 867-2132
Michael Bingham, 9226 Lakewood Circle, Soddy Daisy, TN 37379 842-6627
Darrell Blancett, 687 Charbell Street, Hixson, TN 37343 843-2836
Kenny Hickman, 191 Driftwood Drive, Chickamauga, GA 30707 375-4377
David Hicks, 7727 Tippi Lane, Ooltewah, TN 37363 238-7398
Keith Kincer, 3920 Umbarger Lane, Signal Mountain, TN 37377 886-3926
James W. Little, 353 Warren Drive, Chattanooga, TN 37419 825-0557
Gary Sivley, 1701 Sivley Trail, Signal Mountain, TN 37377 886-6745
Mark Smith, 55 Polk Circle, Fort Oglethorpe, GA 30742 706-866-2784
Perry Stephens, 7701 E. Village Lane, Hixson, TN 37343 842-0649

8.0 FIRE DEPARTMENT RESPONSE

8.1 INITIAL ALARM:

1. Apparatus would respond via normal routes:

Wisdom Street to North Hawthorne Street.

2. Alternate route as follows:

Stuart Street to Wilder Street to North Hawthorne Street.

8.2 INITIAL RESPONSE:

1. Deputy Chief at scene on initial response would enlist assistance of key personnel in evaluating situation.

2. Deputy Chief in charge of initial response would evaluate conditions and determine the need

for additional help in the form of fire fighting equipment and personnel, along with supportive groups such as: Police, ambulances, hospitals, Civil Defense, etc.

8.3 IF ADDITIONAL HELP IS NEEDED:

1. Deputy Chief would order additional alarms struck. He would advise fire alarm of conditions.

2. Police would be ordered to scene to establish fire lines and to assist in evacuating occupants from the area.

3. Public utilities would be ordered to the scene to shut off gas and electric services to the area, if necessary .

4. Civil Defense and hospitals are to be alerted as appropriate.

8.4 ACTIONS TO BE TAKEN:

1. If fire is present, fog and water spray curtains would be set up to protect exposures.

2. If necessary to extinguish fire, dry chemical powder would be utilized.

3. If vapor cloud is present, water fog and spray would be used to break up and disperse cloud --starting with downwind side.

4. Notify and evacuate occupants from area --staring with downwind side.

5. Notify Airport Air Traffic Control tower to alert aircraft to avoid flights over this area.

6. Notify Southern Railroad, L & N Railway and belt line to delay rail traffic in area.

7. Shut off source of ignition in area.

8. Establish lines to keep curious onlookers out of area.

9. Police Department to set up details at main thoroughfares to prevent all but necessary emergency vehicles and personnel from entering area.

8.5 COMMUNICATIONS:

1. Fire Department and Policy Department radio frequencies would be main source of communication.

2. Communications would be achieved through Fire Department and Police Department vehicle radios and walkie-talkies.

3. The Chief of the Fire Department's vehicle would be used as the Command Post. (Distinctive pennant would be placed on this car).

4. In absence of the Chief of the Fire Department, the Deputy Chief's vehicle would be used as Command Post.

8.6 FIRE DEPARTMENT PERSONNEL AT SCENE:

1. Set up equipment and operate same.

(a) To protect exposures

(b) To disperse vapor cloud

(c) To extinguish fire

2. Assist in evacuating occupants from area --starting with downwind side.

9.0 POLICE DEPARTMENT

1. Set up lines as established by the Fire Department.

2. Prevent all curious onlookers from entering the area.

3. Dispatch ambulance to the scene.

4. Alert Burn Center, local hospitals, Civil Defense, etc. as may be required.

5. Call in Auxiliary Policy, if necessary.

6. Assist in evacuating occupants from area --downwind side first --in accordance with the detailed procedures set forth in this plan.

10.0 NOTIFICATION AND EVACUATION OF OCCUPANTS IN THE EVENT OF AN INCIDENT AT THE CHATTANOOGA GAS COMPANY'S LNG PLANT

EXECUTION OF PLAN:

Upon notification from the Fire Department that the area is to be evacuated, the Police Department would take the following actions:

1. Police cruisers would respond to the area and alert occupants by means of cruiser P. A. systems and bullhorns --starting with the downwind side first.

2. Traffic would be stopped at appropriate thoroughfares leading into the area. (Only emergency vehicles and authorized personnel would be permitted to enter the area).

3. Auxiliary Police (if needed) would be activated.

4. Occupants of area would be directed to assembly areas for evacuees.

5. Police Department would keep traffic lanes leading out of area clear of vehicles for evacuation purposes.

6. Ambulances would be utilized for bed-ridden or inform patients.

7. Ambulances would be requested to the scene by radio.

11.0 SUPPORT GROUPS

As the need for other emergency support groups arises, at the scene of an emergency, determination of the need rests with the Chief Fire Officer at the scene. The Police Department responds to all emergencies that require the presence of the Fire Department.

Requests for support groups are made by the Chief Fire Officer at the scene via Fire Department radio. Fire alarm operators have access to names and emergency telephone numbers of support groups and key personnel.

Upon the arrival of the support groups at the scene of the emergency, members in charge of said groups will report to the Chief Fire Officer at the scene and await his instructions.

Notification and dispatching of ambulances is attended to by the Police Department.

Hospitals are notified in advance that patients are being taken to their installation. If possible, the type of injury is relayed to the hospital while ambulance is en route.

12.0 PLANT CALL LIST

LNG Plant Supervisor: Chris Young

Office: 423-624-4843
Cell: 770-315-5208
Pager: 404-776-0954
Home: 423-554-4188

LNG Production Manager: Gary Northrop

Office: 770-479-2125 Ext.202
Cell: 770-856-2125
Pager: 404-776-0905
Home: 770-924-2543

Director of LNG Operations: Richard Rogers

Office: 770-479-2125 Ext. 201
Cell: 404-275-9484
Pager: 404-776-0969
Home: 770-345-7022

LNG Plant Operators:

Robert McCain
Office: 423-624-4843
Home: 706-866-4687

Norman Jernigan
Office: 423-624-4843
Home: 423-629-6123 (Private)
Cell: 423-447-7756

Terry Poss
Office: 423-624-4843
Home: 423-867-7855

Riverdale LNG Plant Control Room 770-478-2442 Ext.412 Location 1300
Cherokee LNG Plant Control Room 770-479-2125 Ext.312 Location 1320
Macon LNG Plant Control Room 912-746-1601 Ext.512 Location 1328

12.1 LOCAL AGENCIES TELEPHONE NUMBERS

FIRE DEPARTMENT -AMBULANCE...911
POLICE DEPARTMENT...911
ELECTRIC POWER BOARD...423-629-3244
TENNESSEE AMERICAN WATER COMPANY...423-267-0021

AFTER 5:00 PM OR SATURDAY, SUNDAY, & HOLIDAYS...423-266-3006

CHATTANOOGA-HAMIL TON COUNTY AIR POLL UNON BUREAU ...423-867-4320
WEATHER BUREAU (PERSON)...423-892-3747

(RECORDING)...423-855-6490

12.2 IN CASE OF EMERGENCY

1.CALL DISPATCHER...423-892-7220

2.ASK DISPATCHER TO INFORM:

LNG Plant Supervisor: Chris Young

Office: 423-624-4843
Cell: 770-315-5208
Pager: 404-776-0954
Home: 423-554-4188

LNG Production Manager: Ben Ward

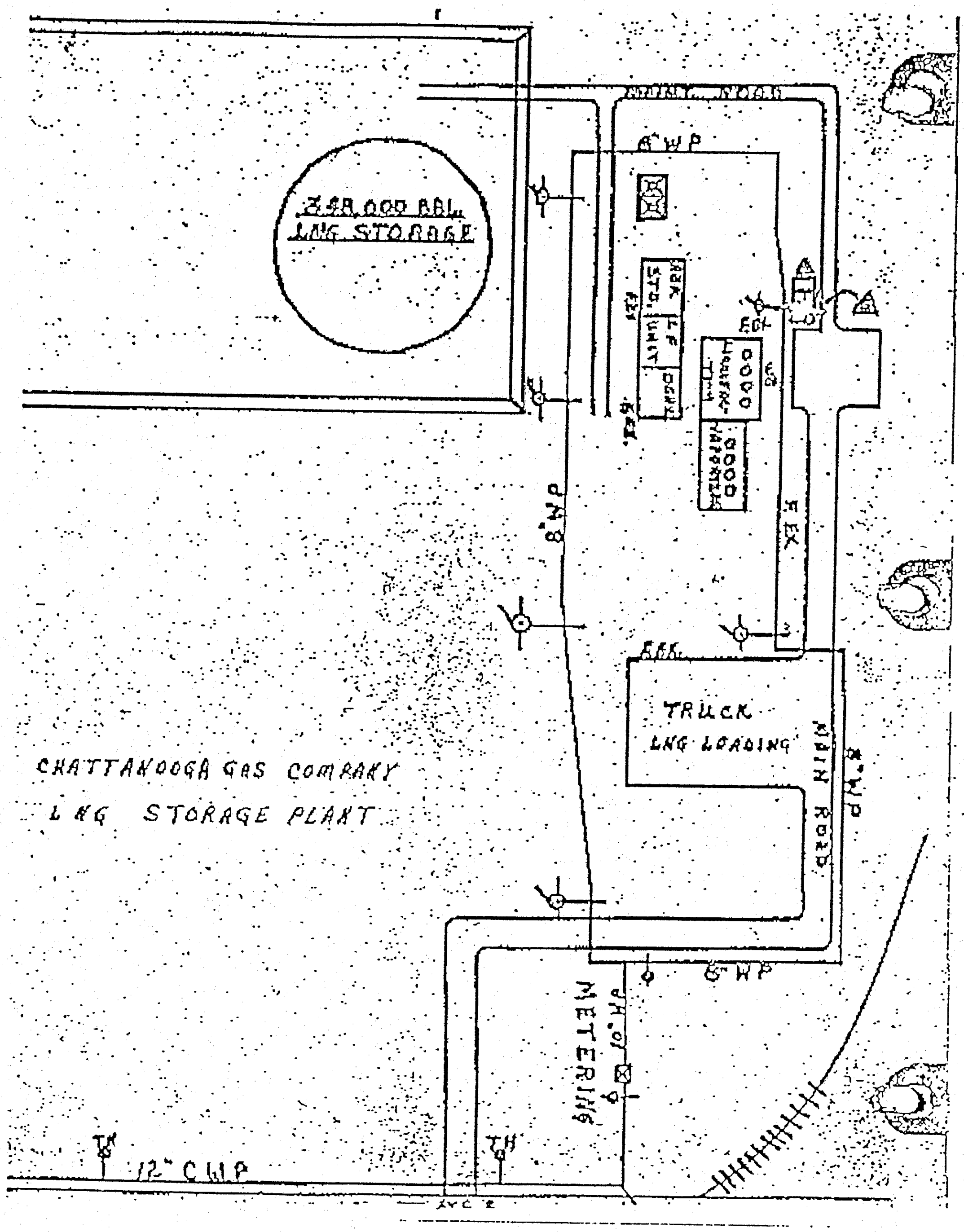
Office: 770-478-2442 Ext. 203
Cell: 404-275-9485
Pager: 404-776-0953
Home: 770-251-4180

LNG Technology Manager: Gary Northrop

Office: 770-479-2125 Ext. 202
Cell: 770-856-2125
Pager: 404-776-0950
Home: 770-924-2543

Director of LNG Operations: Richard Rogers

Office: 770-479-2125 Ext. 201
Cell: 404-275-9484
Pager: 404-776-0969
Home: 770-345-7022



13.0 KEY CORPORATE PERSONNEL

Buck Comer 423-316-0913

Interim Manager
Danny Free 174 Jenkins Road, Cleveland, TN 37320 614-0323
Bruce Jones 6220 Shallowford Road, Chattanooga, TN 37421 855-1367
Riverdale LNG Plant Control Room 770-478-2442 Ext. 412 Location 1300
Cherokee LNG Plant Control Room 770-479-2125 Ext. 312 Location 1320
Macon LNG Plant Control Room 912-746-1601 Ext.512 Location 1328

14.0 REPORTS

14.1 Safety Related Condition Report - Printable version (safetycondition.doc)

Chattanooga Gas Company
811 Broad Street
Chattanooga, TN 37402

Date:	
Submitted By:	
Title:	
Tel. No:	
Report No:	

Person who Determined That the Condition Exists:

Name:	
Title:	
Business Phone:	

Date condition was first determined to exist:	
Date condition discovered:	
Location of Condition:	Chattanooga Gas Company LNG Facility 3401 North Hawthorne Chattanooga, TN 37406 tel:423-624-4843
Description of Condition:	
How discovered:	

Safety Affect:		
Corrective Action Taken:		
Corrective Action Planned:		
Additional Information	**Yes / No**	**No. of Pages attached:**

14.2 Fire and Police Department Review - Printable version (firepolreview.doc)

Date	Representatives	Comments
3-2-93	Fire Chief Day and Stan Williams	Discussed new fencing and plant lighting

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15.0 EMERGENCY SHUTDOWN BUTTONS - Printable version (emergshutbuttons.doc)

INSIDE CONTROL ROOM:

1. PLANT SHUTDOWN HS-05 -Shuts down turbine, vaporizers, LNG pumps, boil-off compressor, York compressor, inlet gas valve, storage tank-105 outlet valve, cooling tower fans and pumps, refrigerant pump,

regeneration gas system, Taylor timer, Regen gas cooler.

2. STORAGE TANK SHUTOFF HS-07 -Shuts off LNG exit from ST-105, will cause vaporizers to trip also.

3. TURBINE STOP HS-04 -Shuts down turbine, York compressor, inlet gas valve, refrigerant pump, Taylor timer.

OUTSIDE CONTROL ROOM:

1. HS-10 -At truck loading station stops LNG flow to truck by closing UV-30.

2. HS-12 -At truck loading station shuts down vaporizers, LNG pumps and boil off compressor.

3. PLANT SHUTDOWN HS-08 -Northeast of scale shuts down turbine, vaporizers, LNG pumps, boil-off compressor, York compressor, inlet gas valve, storage tank -105, outlet valve, cooling tower fans and pumps, refrigerant pump, regeneration gas system, Taylor timer, Regen gas cooler.

4. REFRIGERANT PUMP P-108 -At South end of discharge separator, stop button will stop turbine, York compressor, inlet gas valve, Taylor timer, Regen gas system, refrigerant pump.

5. BOIL-OFF COMPRESSOR -Button on local panel will stop boil-off compressor.

6. TURBINE PANEL TRIP -Hydraulic Oil Dump Valve inside facing front door stops turbine, York compressor, refrigerant pump, inlet gas valve, Taylor timer.

7. YORK PANEL STOP -On South side of York compressor stops turbine, inlet gas valve, refrigerant pump, Taylor timer, York Compressor.

8. LNG PUMP STOP -One button for each of the three pumps on South side of pumps stops them, stops vaporizers due to minimum flow high temperature trip.

9. TURBINE PANEL STOP -Button on front panel outside will stop turbine, York compressor, inlet gas valve, refrigerant pump, Taylor timer, Regen gas system.

16.0 VALVES CLOSED IN EVENT OF EMERGENCY - Printable version (valvesclosedinemerg.doc)

RED VALVES: CLOSE

1. FUEL GAS TO TURBINE -South side of turbine stops turbine, York compressor, refrigerant pump, inlet gas valve, Regen gas system, Taylor timer.

2. FUEL GAS TO VAPORIZERS -One valve to each vaporizer on south side shuts vaporizer down.

3. SOLENOID VALVE UV-01 -Stops inlet feed gas, turbine, York compressor, refrigerant pump, Regen gas.

4. SOLENOID VALVE UV-07 -Stops LNG flow out of storage tank and stops vaporizers.

5. BOIL-OFF OUTLET -Stops B.O. compressor with low suction.

6. INSTRUMENT GAS -Next to UV-01 stops gas to controllers and shuts down turbine, York compressor, refrigerant pump, inlet Regen gas system, gas valve, Taylor timer.

7. FEED GAS FILTER F-101 -Block valve downstream of F-101 stops flow through liquefaction section.

8. INLET GAS -At metering station stops flow into plant, turbine, York compressor, refrigerant pump, Regen gas syste, Taylor timer.

9. OUTLET GAS -At metering station stops flow out of plant, vaporizers, boil-off compressors.

10. STORAGE TANK INLETS -Three valves cut off flow of LNG into ST-105.

GREEN VALVES: OPEN

1. EMERGENCY VENT VALVES -HIC-01 PNEUMATIC VALVE -Behind CO_2 building on methane line.

2. F-101 EXIT VALVE -North end of F-101 lets methane go to flare stack or outlet line.

ORANGE/GREEN VALVES -EMERGENCY VENT VALVES -OPEN -

1. REFRIGERANT SWEEP LINE -Four valves vent to flare stack.

2. HIGH PRESSURE REFRIGERANT DISCHARGE LINE -Four valves vent to flare stack. To depressurize complete refrigerant system, the following valves must be open: 24" suction valve, PDIC -70 valve, JT valves, 14" compressor discharge.

17.0 PROCEDURE TO COMPLETLEY TURN OFF ALL POWER IN THE PLANT

1. Turn off breaker to Boil-off Compressor.

2. Turn off breakers labeled: MCC-A

   Main

3. Turn off breakers labeled: MCC-A

   Normal Feed

4. Turn off all switches in panel labeled: DCP-1

   125 volt DC

   Power Distribution Panel

5. Turn off breaker at Emergency Generator: EG 101

6. Turn off breaker at Emergency Generator: EG 102

18.0 SMOKING RULES

Smoking is NOT permitted within the LNG Plant boundary except in the Designated Area. The plant area is well posted with "NO SMOKING" signs to remind and alert anyone entering the property that No Smoking is allowed.

The Plant Supervisor and the operator on duty are charged with the responsibility of seeing that these rules are followed and have the authority to evict anyone not complying with these rules.

19.0 PROCEDURE FOR LIGHTING FLARE STACK PILOTS - Printable version (flareproced.doc)

1. Start second instrument air compressor.
2. Open valves "A" and "B" for straight through flow. This will operate Pilot No.1.
3. Open valves "C" and "G." This is fuel for pilots.
4. Open valve "D" and set at 10 psig (air). Open valve "E" and set at 10 psig (gas).
5. Purge two to three minutes with this gas-air mixture.
6. Push switch "F" spark to light mixture. Do not hold switch in. Push and release quickly.
7. Repeat steps 5 & 6 until pilot lights.
8. If pilot still does not light, change air pressure slightly and repeat steps 5 & 6.
9. After pilot No.1 is lit, close valve "A" and repeat steps 5 and 6. This will light pilot No.2.
10. When pilot No.2 is lit, close valve "B" and repeat steps 5 and 6. This will light pilot No.3.
11. After pilots are lit, materials to be burned can be admitted to the flare stack.

In case of an emergency, the second air compressor does not have to be started nor does more than one pilot have to be lighted.

20.0 WHEN TO FLARE COMBUSTIBLE GASES - Printable version (flarecombust.doc)

18.0 SMOKING RULES

Smoking is NOT permitted within the LNG Plant boundary except in the Designated Area. The plant area is well posted with "NO SMOKING" signs to remind and alert anyone entering the property that No Smoking is allowed.

The Plant Supervisor and the operator on duty are charged with the responsibility of seeing that these rules are followed and have the authority to evict anyone not complying with these rules.

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3. Open valves "C" and "G." This is fuel for pilots.
4. Open valve "D" and set at 10 psig (air). Open valve "E" and set at 10 psig (gas).
5. Purge two to three minutes with this gas-air mixture.
6. Push switch "F" spark to light mixture. Do not hold switch in. Push and release quickly.
7. Repeat steps 5 & 6 until pilot lights.
8. If pilot still does not light, change air pressure slightly and repeat steps 5 & 6.
9. After pilot No.1 is lit, close valve "A" and repeat steps 5 and 6. This will light pilot No.2.
10. When pilot No.2 is lit, close valve "B" and repeat steps 5 and 6. This will light pilot No.3.
11. After pilots are lit, materials to be burned can be admitted to the flare stack.

In case of an emergency, the second air compressor does not have to be started nor does more than one pilot have to be lighted.

20.0 WHEN TO FLARE COMBUSTIBLE GASES - Printable version (flarecombust.doc)

It should not be necessary to flare refrigerants or vent methane during normal operations. On occasion when a vessel or line is cleared generally to perform maintenance or in emergency situations, the wasted refrigerants must be discharged to the atmosphere through the flare stack. The heavier than air components such as the isobutanes and isopentanes tend to remain close to the ground before being dispersed, causing a potential fire hazard. To prevent this possibility, controlled venting to the flare stack and subsequent ignition at the top is used to destroy these hazardous materials.

During the venting procedure careful monitoring of the surrounding areas by a qualified operator must be performed with a portable MSA Explosimeter to detect and prevent any buildup of hazardous gases at ground level.

21.0 LNG & REFRIGERANT SPILL CONTAINMENT - Printable version (lngreferspill.doc)

Within the perimeter of the boundaries of the Chattanooga Gas Company LNG plant a set of dikes has been constructed to contain any spill of LNG or refrigerant.

A large dike surrounds the LNG storage tank. The area enclosed by this dike will contain the entire capacity of the LNG storage tank.

About midway at the west side of the dike a pump has been installed to remove any rain water collected within this area. This pump P-104 has a capacity of 1500 gallons per minute. It sits in a concrete sump to which all the rainwater drains, has a manual drip oiler for packing lubrication, and pumps the water through the side of the dike via an 8" line. This pump should be operated during daylight hours whenever water has accumulated. The diked-in area should be kept free of any accumulation of water.

To operate this pump the following steps should be taken:

1. Check the breaker to be sure it is engaged and depress the reset button.
2. Add lubricating oil to the oil reservoir. Presently we are using Texaco Regal Foil.
3. Manually set packing oiler to drip 5-10 drops per minute.
4. Open slide gate on the discharge side of the dike.
5. Start pump.

Pump out as much water as possible but make every effort to turn it off before it starts to cavitate or pick up stones and gravel.

When complete, turn off pump and oiler and close slide gate when water stops draining from the line.

The liquefaction, vaporization and truck loading areas are also contained to prevent any LNG from leaving the plant. A valve in the northeast ditch is manually controlled to remove the water in this ditch, but to contain any LNG spill. In dry weather when there is no blowdown from the cooling tower this valve should be kept closed. It should be opened only far enough to allow only water to pass through the opening in the valve.

At the southeast section of the vaporization area is a small 2" drain valve that is used to remove any water from this area. This valve should always be kept closed except when actually draining water.

The truck loading scale has a drain valve close to the southeast drain ditch. It too should only be opened to drain the water from the scale pit.

Under no circumstances should the NE, SE or scale drain be opened while loading tank trucks or vaporizing.

22.0 PAD GAS PROTECTION

The LNG tank pad gas system has been placed in operation.

Pad gas either from the B.O. compressor discharge or the incoming gas line will admit gas to the LNG tank to prevent a vacuum in this tank.

Pressure controller 15 is set to admit gas from the B.O. compressor when the pressure in the LNG tank falls to 0.21 psig.

Pressure controller 16 is set to admit plant incoming gas when the pressure in the LNG tank falls to 0.18 psig.

The LNG tank pressure is transmitted through pressure transmitter 13. Before any repairs are made to this transmitter, associated piping or the valve close to this transmitter the block valve upstream of PC 15 and the block valve near UV-01 from the incoming gas line must be closed. If this is not done, gas will enter the LNG tank.

Unless the LNG tank is completely emptied, the pad gas system should never allow gas into the tank since the pressure should never fall to 0.21 psig.

IVC-19

23.0 FIRE EXTINGUISHER LIST

No.	Location	Size	Brand	Type	Pressure	
1.	Control Room	30#	General Ansul	Dry Chemical	195#	
2.	Control Room Corridor	10#	Ansul Ansul	Halon 1211 Halon 1211	100#	
3.	Behind Control Panel	10#	Ansul	Halon 1211	100#	

4.	Instrument Shop	10#	Kiddle Ansul	Dry Chemical	100#	
5.	Maintenance Shop	30#	Kiddle Ansul Ansul	Dry Chemical Halon 1211	Canister	
6.	Motor Control Room	30#	Ansul Ansul	Dry Chemical	235#	
7.	Motor Control Room	10#	Ansul Ansul	Dry Chemical	100#	
8.	East End EG-101	10#	Amerex Ansul	Dry Chemical	195#	
9.	Portable Welder	30#	Ansul Ansul	Dry Chemical	Canister	
10.	Storage Building	20#	Amerex Ansul	Dry Chemical	Canister	
11.	Oil Barrel Storage Containment	30#	Ansul Ansul	Dry Chemical	Canister	AB
12.	Truck Loading Dock	20#	Kiddle Ansul	Dry Chemical	Canister	
13.	Truck Loading Dock	300#	Ansul Ansul	Dry Chemical	2000# Canister	E
14.	Boiler Building -West Door	30#	Kiddle Ansul	Dry Chemical		
15.	Boiler Building	125#	Ansul Ansul	Dry Chemical	240# Canister	
16.	Boiler Building -East Door	30#	Ansul	Dry Chemical	195# Canister	
17.	North of Cold	20#		Dry Chemical	240# Canister	
18.	North of York Compressor	30#		Dry Chemical	Canister	
19.	North of G.E. Turbine	125#		Dry Chemical	Canister	
20.	West of Turbine	20#		Dry Chemical	235#	
21.	West of Refrigerant Pump	20#		Dry Chemical	Canister	
22.	South of Dehydrators	20#		Dry Chemical	Canister	
23.	LNG Pump Switches	30#		Dry Chemical	Canister	
24.	Top of LNG Tank	10#		Dry Chemical Dry	195#	

24.				Dry Chemical	Canister
25.	Compressor Building -East Door	30#		Dry Chemical	Canister
26.	Compressor Building -South Door	30#		Dry Chemical	Canister
	Tractor	10#		Dry Chemical	Canister
27.	Southwest Corner of Vaps. (G.L.)	20#		Dry Chemical	
28.	Westside Vaporizers (2nd Level)	30#			
29.	Westside Vaporizers (3rd Level)	20#			
30.	EG-102 Building -West Door	30#			
31.					

IVC-20

24.0 LEAK SURVEY PROCEDURE

Leak detectors are in service to cover the various process and I storage areas. These detectors continually monitor all sections of the plant where an explosive mixture might accumulate and give an alarm when combustibles are detected.

To augment these sensors and alarms the following leak survey procedure will be used:

Each week, and/or immediately if a leak is suspected, the operator will make a leak survey with the plant's portable combustible gas indicator. See operating instructions on the MSA Explosimeter case.

The following areas will be covered in each and every survey:

1. Control room office
2. Behind control room panel board
3. Electrical switch gear room
4. Emergency generator
5. Vaporizer area
6. LNG pump area
7. Boil-off compressor area

8. Cold box area

9. D104 area

10. Refrigerant compressor and seal gas system area

11. Turbine area

12. Truck loading area

13. Dehydrator and orbit valve area

14. Refrigerant storage area

15. D105 and refrigerant condenser area

16. Atop cooling tower

The general areas will be checked and specific attention given to valve packings, pipe connections, cabinets, etc.

Minute leaks where suspect may more readily be found using the soap bubble test.

If any indication of a combustible mixture is indicated, the operator shall pinpoint the source and make necessary repairs to stop the escaping gas.

All leaks found are to be logged in the plant logbook indicating the area, percent combustible and the repair procedure followed.

Record in the proper place on the yearly checklist sheet in the Maintenance Procedures Manual.

25.0 GENERAL MONITORS GAS SENSOR OPERATION

The LNG plant is equipped with sensors to detect the presence of hydrocarbons in the atmosphere at various locations.

The monitors are located in the control room and register percent LEL on a scale of zero to one hundred. The monitors are equipped with a yellow warning indicator light which lights at about 35% and a red indicator light which registers at approximately 55%. The plant annunciator horn alarms at 35%. Both the sensors and monitors are recalibrated at least twice a year with 50± 5% LEL methane gas.

The large monitor senses ten locations in the plant area as indicated on the front panel.

One of the two-point monitors indicates the hydrocarbon concentration behind the panel board and in the switch gear room.

The other two-point monitor senses the hydrocarbon concentration in the box surrounding the LNG pump cable air gap and the concentration in the air intake duct to the control room gas heater.

Any reading above zero on the monitors should be quickly investigated for detection of methane. LNG or refrigerant leaks. It should be noted that high winds will create false readings on the monitor.

The sensor in the gas heater air duct upon sensing 50% LEL will energize a solenoid in the gas line to the heater cutting off the gas supply. The pilot should not be relighted until after a complete investigation is made and corrective action taken.

IVC-22

26.0 SOURCES OF POSSIBLE SAFETY HAZARDS

The Chattanooga Gas Company's LNG Peak Shaving Plant was constructed in accordance with all state, federal and local rules and ordinances in effect in 1972.

All accepted standards were used for this type plant and its equipment. Since that time it has been updated as new regulations from any of the agencies have come into effect.

The plant was designed as a "Fail Safe" operation to prevent injury and damage to equipment. Should any of the equipment fail or any temperatures or pressures go beyond a predescribed range, well within a dangerous limit, the plant or portions thereof will automatically shut down with the proper action taken by the instrumentation.

The following is a list of hazards the operator should be aware of and be able to cope with during his tour of duty. It is by no means intended to cover every conceivable specific and individual circumstance. This list is to be used as a checklist defining broad categories wherein lie particular potentials for safety hazards.

1. Earthquake -The LNG storage tank is designed to withstand zone two quakes. Should one occur, the plant should be shut down immediately, and complete assessment of damage made.

2. Flood - The Tennessee Valley Authority has built a series of dams on the Tennessee River to eliminate flooding of low lying areas by controlling the discharge through the gates.

3. Extreme weather conditions -

   A. Windstorm -The LNG storage tank is designed to withstand 100 MPH winds. Flying objects may cause injury or damage to any of the equipment on the plant.

   B. Snow, Hail and Ice -A snowload of 25 PSF has been designed into the LNG storage tank. The weight of snow and ice may cause breakage in pipes and electrical lines.

   C. Heat - Extreme heat from daytime temperatures, welding, poor insulation, heat producing equipment, direct sunlight and fire may cause rapid expansion of gases and subsequent rupture of pipes and vessels.

   D. Rain - The water from excessive rainfall over a prolonged period of time can be controlled by opening the plant dike drains. A sump pump in the LNG storage tank dike is used to remove the water from this area. Should the pump fail or not carry the load, the valve to the outlet line may be opened.

4. Nuclear Radiation - Possible sources include foreign and domestic nuclear testing, attacks by foreign countries, accidents to carriers, x-rays, and local nuclear energy plants. Operators should be aware that x-rays of pipe, vessels and associated welds constitute a health hazard and personnel should stay clear of these areas when this work is being performed. Radiation and fallout are generally carried by prevailing winds and water, vegetables and animal foods must be carefully monitored before ingesting. In the event of possible radiation, evacuation procedures will be initiated and the operator will shut down the plant and immediately go to the nearest fallout shelter.

5. Planes - Aircraft must maintain an altitude of at least 1500 feet above ground level in congested areas in the City of Chattanooga. Because of the hilly terrain, it is unlikely that any will come this close. The LNG plant is not in an air restricted corridor and aircraft are allowed to fly over the plant. The possibility exists that planes

or missiles might drop from the sky.

6. Firearms - Firearms are forbidden on plant property. The City of Chattanooga also has a firearms law forbidding the discharge within city limits but it is not strictly enforced. Hunters or persons likely to discharge weapons on adjoining property should be reported to the local police immediately.

7. Noxious Gases -These may be a result of accident from industry in the vicinity or accident to rail or truck shipments. It is always good to be constantly aware of wind direction so that escape to the upwind or crosswind direction is possible.

In-plant hazards may be the result of leakage or spillage of natural gas or LNG and refrigerant. Fumes from natural gas, LNG, Nitrogen, Ethylene and Propane tend to rise. The fumes from isobutane and isopentane are heavier than air and tend to hover at ground level before being dispensed. The most common problem is suffocation due to the lack of oxygen although ethylene is anesthetic.

8. Sabotage - Damage to plant property, equipment, and personnel may be the result of riots, picketing, vandalism and malicious mischief. Personnel should always be on guard against any disturbance or damage and report it immediately.

9. Explosion - This is the result of excess pressure causing rupture of a pipe or vessel. It may be caused by a slow buildup of pressure or fire causing a rapid expansion of gases confined in an enclosed area. LNG trapped between valves that do not have thermal relief between the valves can cause a rupture as it warms up and expands.

10. Bites - Insect, snake, and animal wounds should be treated as soon as possible. The possibility that physical or mental processes may be impaired always exists.

11. Deterioration - Corrosive chemicals are not used on the plant nor is there more than a normal corrosive atmosphere. Normal atmospheric corrosion and corrosion in the plant's water systems are a constant source of concern and the operator should be aware of the consequences.

12. Mechanical Accidents - Common causes are card, trucks, other motorized vehicles, lawn mowers, use of improper tools and equipment or in unsafe conditions, and falling objects. All these may cause damage to equipment and personnel or cause spark-produced fires.

13. Burns - Insulation is provided at normally accessible places to provide personnel protection from hot and cold cryogenic lines and equipment. If care is not exercised, contact can be made with exposed surfaces not insulated.

14. Leaks - Thorough routine inspections carefully using the senses of sight, smell and hearing will detect liquid and vapor leaks. Use of an explosimeter and/or soap bubbles will help to pinpoint the exact source of the leaks. Most leaks will occur at interconnections of pipes, vessels, instrumentation and valve and pump packings. They may be caused by corrosion, improper use of materials, loose connections, vibration, weld stress, and thermal shock caused by a sudden increase or decrease in temperature. Care must be taken to slowly cool down LNG lines.

15. Suffocation - Aside from entering an open area of fumes, the most common cause is entering vessels containing insufficient oxygen. In such cases the individuals become weak, sleepy and/or lightheaded before passing out due to the lack of oxygen in the bloodstream. Before entering any vessel it should be thoroughly purged with air and tested for sufficient oxygen. A constant supply of air should be provided while inspection or repairs are made. A safety harness or rope should be attached to the individual with enough manpower provided to pull the individual to safety should the need arise.

16. Electrical - These hazards may be the result of lightning, alternating current, direct current, and static electricity. Insulation breakdown, switches, contact points, electrical shorts and sparks may be the cause of fires, burns, and shock. Careful and qualified inspection of all electrical lines and equipment should be made periodically and a cursory check should become apart of the routine daily performance.

17. Fire - Sources of ignition include matches, lighters, torches, lightning, electrical current, sparks from internal combustion engines and spark producing tools and spontaneous combustion. Hydrocarbons, oil, paints and thinners, combustible materials, friction from overheated belts and bearings are excellent vehicles for starting and sustaining fires.

18. Safety Equipment and Instruction - Operators must always be alert to the fact that the malfunction of instruments and controls is always possible. Total reliance should not be given to such things as relays, switches, fire extinguishers, fuse plugs, thermocouples etc. Careful and frequent inspection of these items and

periodic testing should be performed.

For practical purposes the plant has arbitrarily been divided into sections to facilitate inspections and acquaint the personnel of possible hazards. The areas or sections are as follows:

1. Outside the Security Fence - Major causes of concern are from fires, disturbances, industrial accidents, train derailment and truck accidents.

2. Security Fence - The perimeter of the LNG plant is surrounded by a chain link fence topped with barbed wire. Inspection of the fence should include damage to the fence, locks, and gates.

3. Wooded and Grassy Areas Inside the Fence - Fire from any source, telephone and power lines and supports are items requiring attention.

4. Metering Station Near Main Gate - Leaks at any of the connections on the incoming and outgoing headers and orderizing equipment should be repaired immediately. Electrical power to the meters and intergraters may be a source of spark.

5. LNG Storage Tank Diked Area -This area must be kept free of combustibles such as paper, cloth, dried grass, wood, and oil to minimize sustained combustion.

6. B.O. Compressor - Methane, LNG and oil leaks must be attended to immediately. Power to the controls, compressor motor, and oil pump motors provide a source of hazard. Abnormalities in pressures and temperatures must be corrected immediately.

7. LNG Pumps - Leaks around the tank outlet and pumps constitute a hazard. Electrical lines and connections to the pump motors and switches should be checked frequently.

8. Process Drain Sump Tank (ST-106) - Contains oils and hydro- carbons. It is equipped with a flame arrestor and pump and motor. Overflow and fire are the main concerns.

9. Cooling Tower -This is a modern structure capable of deterioration and fire. Lightning and electrical pumps and fan motors are associated. Leaking process exchangers might allow hydrocarbon to migrate to the cooling tower.

10. Control Building - Switch gear room and power transformers. This room is separated from the operations room by a concrete block wall. Methane, hydrocarbons, paints, oils and combustible materials create a fire hazard with sparks from the electrical switches.

11. Control Building Operations Room - Combustibles make up a I large part of the material in this room. Organic liquids and vapors should be kept to a minimum. A gas fired hot water heater and gas heating system are part of the equipment for this room.

12. Emergency Generator - Gas fired generator should be checked for leaks periodically.

13. Oil Storage - Small quantities of paint, oil and grease are stored in a metal building while drums of oil are stored next to it. Oil leaks from these sources should be cleaned up immediately.

14. Spare Parts Storage Building - This prefabricated metal building contains large quantities of paper, cloth and other combustible material. Solvents, paints and other organics should not be stored in this building.

15. LNG Storage Tank - Contains LNG. Controls are to be checked periodically. Any deterioration to the outer shell or base should be noted.

16. Truck Loading - Spills, fires and explosive mixtures are a distinct possibility. Personnel injury due to LNG burns from hose handling is the most common source of trouble. Extreme care should be taken in the performance of this operation.

17. Vaporizers - These are direct fired (open flame) heat exchangers. Careful inspections of the coil is a necessity. All controls and safety devices must be in proper working order. Gas or LNG leaks must be repaired immediately. Electrical equipment must be maintained.

18. Dehydrators - Sources of methane leaks are generally found around the orbit valves associated with this equipment.

19. Refrigerant Storage - Refrigerant cylinders must be handled carefully to prevent personnel injury. Special care should be taken to prevent breakage of the valves on these cylinders. All leaks associated with the cylinders, piping and refrigerant storage tanks should be repaired immediately.

20. Pipe Racks - Cable Trays - Supports for pipes and electrical cables should be checked periodically to be sure they are in good condition.

21. G.E. Turbine - The gas fired turbine creates a tremendous quantity of heat. Breakdown of the equipment could be hazardous. All controls and safety devices must be in proper working order. A large oil reservoir and oil piping is connected with this equipment and fires are always a danger.

22. York Refrigerant Compressor - Turbine driven. This compressor circulates the refrigerant in the liquefaction system. All controls must be in proper working order. Periodic inspections must be made for wear and clearance.

23. Cold Box - All leaks on piping to and from this exchanger should be repaired immediately.

27.0 PLANT EMERGENCY COMMUNICATIONS

The LNG Plant Emergency Communication system consist of two radio systems.

The IN-Plant radio system is used for IN-Plant communication between the control room and the field. This system consists of four mobile units and one base unit, located in the control room.

APPENDIX J

INSPECTION
BY
BRAD WILLIAMS

TENNESSEE REGULATORY AUTHORITY

460 James Robertson Parkway
Nashville, Tennessee 37243-0505

REPORT OF NATURAL GAS SAFETY INSPECTION
FILE ONLY

OPERATOR: Chattanooga Gas Company – Chattanooga, Tennessee

PERSON(S) CONTACTED: Chris Young

INSPECTION DATE: 5/3/01 – 5/4/01 **TRA ENGINEER:** Brad Williams

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Any questions pertaining to this report may be directed to the above address or by telephoning (615) 741-2844 ext. 184. (Call toll-free at 1-800-342-8359, ext. 184)

1. **PURPOSE OF INSPECTION:** To interview personnel and gather information related to the continuing investigation of the Chattanooga Gas Company Liquified Natural Gas (LNG) plant incident which occurred 10/23/00.

2. **VIOLATION(S) OF THE MINIMUM FEDERAL SAFETY STANDARDS:**

   A. Violation(s) Cited this Inspection: Under Investigation

   B. Violation(s) Previously Cited: Under Investigation

   C. Violation(s) Closed this Inspection: None

3. **OBSERVATIONS, COMMENTS, AND RECOMMENDATIONS:** An interview was conducted with Chris Young of Chattanooga Gas Company in relation to wrapping up the investigation of the natural gas incident which occurred on 10/23/00.

4. **ACTION REQUIRED BY OPERATOR:** Pending

s:\report01

CHATTANOOGA LNG INCIDENT
MAY 3-4, 2001
INVESTIGATOR: BRAD WILLIAMS

The following is a summary of the information obtained from Chris Young of Chattanooga Gas LNG facility on May 3rd and 4th 2001. This visit was made in an effort to obtain additional information related to the incident at the plant on Oct. 23rd 2000. All of the following are statements made by Chris Young.

The chronology of operations during maintenance:

06/28/00	Changed molecular sieve.
07/01/00	Replaced gasket(s) on flange.
07/01/00	Began sandblasting and painting of process area piping.
07/05/00	Started vaporization.
07/30/00	Stopped vaporization.
08/01/00	Started vaporization.
08/04/00	Stopped vaporization.
09/01/00	Started liquefaction.
10/14/00	Stopped liquefaction.
10/16/00	Started liquefaction.
10/23/00	Date of incident

I. UV DETECTORS

A. UV Detectors were operational at all times
B. UV Detectors' Emergency Shutdown (ESD) capability is bypassed whenever the plant is in liquefaction mode.
C. UV Detectors are equipped with audible and visible alarms in control room.
D. UV Detectors' audible and visible alarms did engage at the time of the incident by no log or other record is available.
E. It is unknown when the UV Detectors were installed at the plant.
F. UV Detectors' ESD was on bypass from 9/1/00 to 10/14/00 and from 10/16/00 to 10/23/00 (time of incident).
G. 10/9/00 was last semiannual UV Fire detection & gas detection inspection.

II. GAS DETECTORS

A. Gas detectors were operational at all times.
B. Gas detectors do not have ESD capability.
C. Gas detectors have audible alarm in control room.
D. Gas detectors did not detect any gas at the time of the incident.
E. CGC Emergency manual states that gas detectors are to give a yellow alarm at 35% LEL. 193.2819 states that gas detectors must sound alarm at 25% LEL.

III. STRAINERS

A. Do not have any manufacturer's information on witches hat strainers.
B. Do not know when they were installed.

IV. GASKETS

A. Does not now know if the spool section was removed or not.
B. The top gasket is missing.
C. The bottom gasket may or may not be the same material and age as the top gasket.
D. No analysis has been done on the bottom gasket.

E. The gasket(s) were replaced because the old one(s) was leaking. The old gasket(s) appeared to be rotted.
F. No specifications on old gaskets available.
G. The apparent maximum temperature rating of the replacement gaskets was 500 degrees Fahrenheit. (Manufacturer's specifications in mail).

V. GAS TEMPERATURE

A. A Foxboro Controller maintains the maximum temperature of the gas upstream of the Dehydrators.
B. The Foxboro Controller was set at 550 degrees Fahrenheit at the time of the incident.
C. The Controller is located approximately 100 linear feet upstream of the point of failure.
D. The closest temperature probe is located downstream of the dehydrator and point of failure.
E. The temperature probe recorded a maximum sustained temperature of 510 degrees Fahrenheit prior to failure.
F. The temperature probe recorded a temperature of 310 degrees Fahrenheit at the time of failure.
G. The actual temperature of the gas at the point of failure is unknown. A safe assumption is between 510 degrees and 550 degrees Fahrenheit.
H. There is no audible alarm to indicate when the gas temperature exceeds the set temperature.
I. Chris Young, Terry Poss, and Norman Jernigan were the personnel who changed out the flange gaskets on July 1, 2000. Molecular sieve bed was changed out on June 28, 2000.
J. No procedures were followed during change-out. An impact wrench was used to tighten the bolts of flange.
K. The flange was pressure tested to 230 psig. The gas was at ambient temperature during the test.

VI. TARPS

A. No maintenance plan or Fire Prevention Plan discussing the additional potential fire hazards (tarps) during the painting process as required by 193.2805.

VII. FIRE DEPARTMENT OFFICIALS

A. The last meeting with fire officials was June 20, 2000. Chris Young met with Capt. Adams of the local fire department. The meeting was a "get to know ya", "here is what we are going to do" type of meeting. Capt. Adams looked at the layout of the fire control equipment and check the portable extinguishers.

VIII. AGL DATA REQUEST RESPONSE

A. See attached document and correspondence.

Atlanta Gas Light Company

May 18, 2001

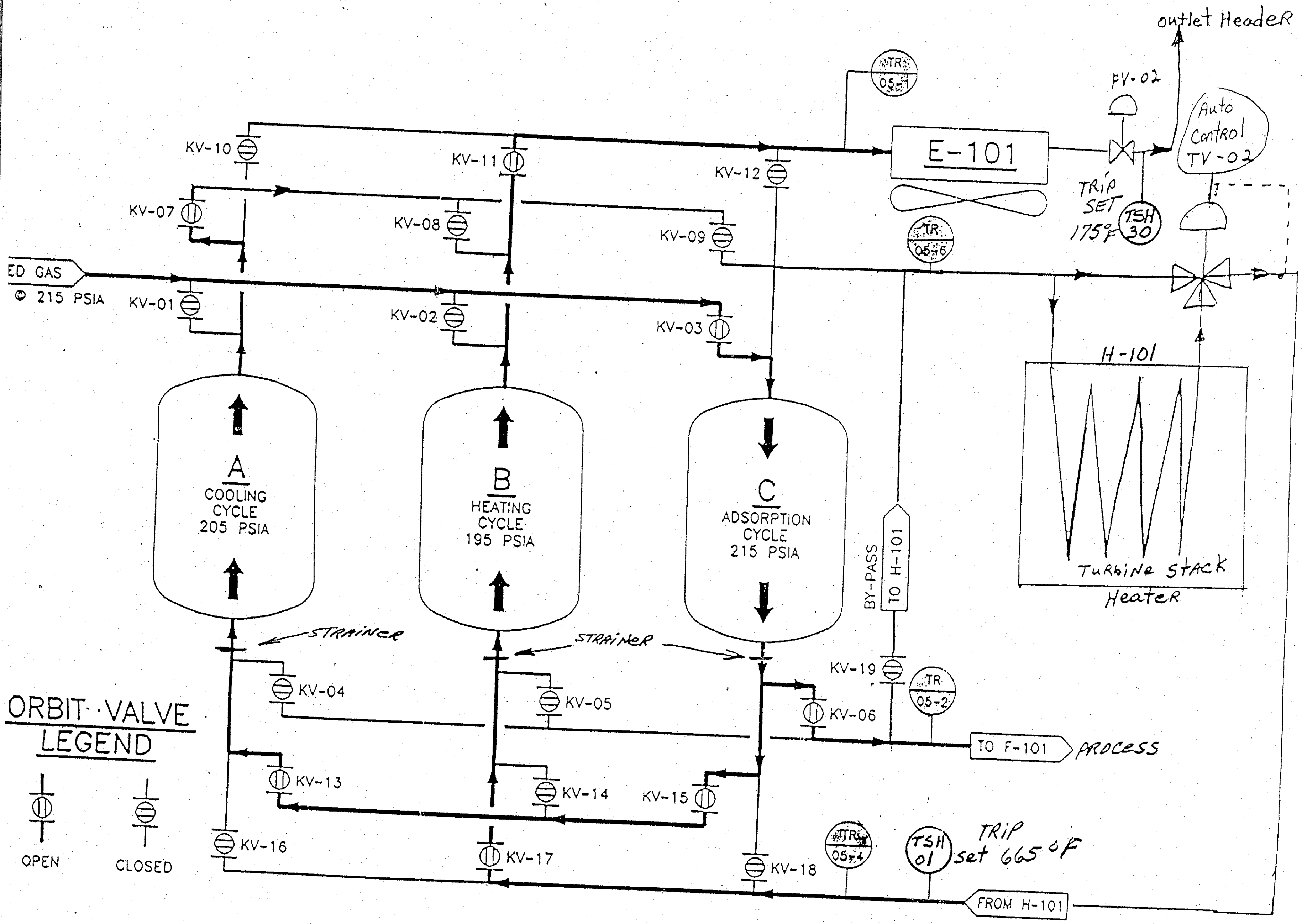
Chattanooga LNG Plant
3401 North Hawthorne Street
Chattanooga, Tennessee 37406

To whom it may concern,

The following information as per your request:

- This data is standard operating pressures and temperatures for the pretreatment system.
- The specific data was obtained from charts for the dates of 9/01/00 to 10/23/00.
  - Temperatures were recorded on a Yokogawa chart recorder.
  - All data was monitored and obtained from chart recordings and local readings.
- The cycle time for the Chattanooga LNG Plant dehydrators is ninety minutes.
- The normal regeneration cycle for each dehydrator bed consists of three phases.
  - The first phase is the heat cycle. The temperatures for that cycle reached five hundred ten degrees F.
  - The second phase is the cool cycle. The temperatures for that cycle decreased on average to one hundred thirty degrees F.
  - The third and final cycle is the adsorb cycle. The temperatures for that cycle decrease on average range from eighty to one hundred thirty degrees F.
- Standard operating pressure for the dehydrators is line pressure (normally two hundred ten pounds per square inch to two hundred thirty pounds per square inch)
  - Line pressure was two hundred thirty pounds per square inch on 10/23/00.
- Regarding the removal of the dehydrator witch's hat spool piece.
  - After system was pressurized a gas leak developed from the top gasket of spool piece.
  - The spool piece was slide to the side for gasket replacement.
  - The top gasket was replaced and system was pressurized. No leaks were found.
    - Specifications are undeterminable due to the amount of damage incurred on this gasket rendered any markings unreadable. If more information is required, an investigation will need to be conducted on the gasket by an engineering firm and/or gasket manufacturer to obtain reliable information and results would be forthcoming. This could be a lengthy process. Please advise.

Respectfully
Chris Young
Chris Young
Chattanooga LNG Plant Supervisor


outlet Header
TR 05-1
FV-02
Auto Control TV-02
E-101
TRIP SET 175°F
TSH 30
KV-10
KV-11
KV-12
KV-07
KV-08
KV-09
TR 05-6
ED GAS
@ 215 PSIA
KV-01
KV-02
KV-03
H-101
A
COOLING CYCLE
205 PSIA
B
HEATING CYCLE
195 PSIA
C
ADSORPTION CYCLE
215 PSIA
BY-PASS
TO H-101
Turbine stack Heater
STRAINER
STRAINER
KV-04
KV-05
KV-06
KV-19
TR 05-2
TO F-101
PROCESS
KV-13
KV-14
KV-15
KV-16
KV-17
KV-18
TR 05-4
TSH 01
TRIP set 665°F
FROM H-101
ORBIT · VALVE LEGEND
OPEN
CLOSED

From: Brad Williams
To: "cyoung@aglresources.com".SMTP.tn01
Date: 5/15/01 3:02PM
Subject: Re: Chattanooga LNG Plant Dehydrator Information

Chris,

In my original request over the phone, I asked for a statement reflecting the actual temperature ranges for the gas flowing through dehydrator B during the heating modes for the time period 9/1/00 through 10/23/01. Your letter does not address this specific time period. Also, the date 9/23/01 is referenced for an unknown reason. Perhaps you meant 10/23/01 (date of the incident). The purpose of the letter is to substitute for the actual recorder records.

Also, I am still waiting for a written answer regarding whether or not you removed the spool section containing the witch's hat strainer and replaced all gaskets or just the top gasket. I need to know the manufacturer and type of the bottom gasket and whether or not it is identical to the top gasket that was never found. Was the top gasket actually ever found? You indicated some uncertainty about this fact. If so, I need to see it.

Finally, I need a diagram illustrating the gas flow during the heating mode, with the heater, strainer, dehydrator, and temperature probe identified.

I am trying my best to wrap this investigation up just as soon as I can. Your expediency is appreciated.

-Brad

>>> "Chris Young" <cyoung@aglresources.com> 05/15/01 06:08AM >>>
Please see attached letter. Meeting your approval a signed letter will be sent via U. S. mail.

Chris Young
LNG Plant Supervisor
Chattanooga LNG Plant
3401 North Hawthorne Street
Chattanooga, Tennessee 37406-4024
Phone # 423.624.4843 x611
Fax # 423.629.1893

APPENDIX K

INVESTIGATIVE REPORT: ENGINEERING DESIGN & TESTING CORP.

ENGINEERING DESIGN & TESTING Corp.

ENGINEERS / CONSULTANTS / LABORATORIES

CHARLOTTE DISTRICT OFFICE:
Post Office Box 668565
Charlotte, North Carolina 28266-8565

(704) 523-2520
Facsimile Transmission:
(704) 523-2597

DATE: December 14, 2000 (REVISED 12/19/00)

REPORT TO: Mr. Paul Wagner
Director of Risk Management
ATLANTA GAS LIGHT COMPANY
Location 1470
Post Office Box 4569
Atlanta, Georgia 30302

FROM: Michael D. Pratt, P.E.

REFERENCE: Cause of Fire at LNG Facility
D.o.L.: October 23, 2000
L.o.L.: Chattanooga, Tennessee
ED&T File Number: CLT3973-12973

NORTH CAROLINA PROFESSIONAL SEAL 022645 ENGINEER MICHAEL D. PRATT 12/19/00

At the request of Mr. Bill McCallum with McGriff, Seibels & Williams, Inc., representing Atlanta Gas Light Company, Engineering Design & Testing Corp. (ED&T) has conducted an investigation of a fire that occurred at a liquid natural gas (LNG) facility in Chattanooga, Tennessee on October 23, 2000. The purpose of the investigation has been to ascertain the cause and origin of the fire. An on-site inspection at the facility took place on December 4, 2000 with Mr. Chris Young, Plant Supervisor, present. The photographs in Figures 1-4 were provided to this investigation, while the photographs in Figures 5-7 were taken by ED&T at the time of the on-site inspection.

As a result of the investigation, a number of observations have been made and conclusions reached. It should be noted that the opinions and conclusions stated herein are based on information available as of this writing. It is conceivable that additional information may be forthcoming which bears on these opinions and conclusions. The right is reserved, therefore, to review and modify all opinions and conclusions at any future point in time should, in fact, additional information become available.

BACKGROUND INFORMATION

1. Mr. Young reported that the facility was being operated in liquefaction mode at the time of the incident. Operator Joel Paris was in the facility control room, monitoring the processes, when he heard an explosive noise. Upon investigation in the facility, Mr. Paris discovered a fire in an area adjacent to three dehydrators. The fuel source for the fire was natural gas leaking from a vertical length of pipe. Mr. Paris manually initiated the emergency shutdown system, and the fire was extinguished after the flow of natural gas had ceased.

2. Upon removal and disassembly of the vertical pipe section, it was discovered that the flange of an internal witch's hat strainer had fractured, providing a path for natural gas leakage out of the pipe. A portion of the strainer flange was ejected from the pipe and was not recovered from the scene. The strainer was removed from the pipe and sent to a laboratory for further evaluation and inspection. The strainer has not been made available to this investigation.

3. Mr. Young reported that, at the time of the incident, natural gas was flowing through the vertical pipe in question. He said that the fluid was pressurized to approximately 230 psig, at a temperature of approximately 550°F.

OBSERVATIONS

1. The vertical pipe where the leak occurred was connected to dehydrator D-102B. There was a spool piece in the pipe that was approximately 32 inches long, and this spool piece contained the witch's hat strainer. Figure 1 is a view of the spool piece after removal from the pipe.

2. The witch's hat strainer had been installed vertically in the spool piece with the cone of the strainer pointed downward. The upper flange of the spool piece had been bolted to an 8 inch pipe flange upstream of the spool piece. The strainer was held between the two bolted flange faces, and gasket material was installed between the faces to seal the joint. Figure 2 is a view of the bolted connection where the natural gas leak was discovered.

3. Mr. Young reported that a painting company had been working in the vicinity of the dehydrators early on the day of the incident. The painters had draped plastic sheets over a number of horizontal pipes that were approximately 12 feet off of the ground. Figure 3 is an overhead view of the remains of the plastic sheets, indicated by Arrow 1, after the incident. This view was taken from a catwalk at the top of the dehydrators. Arrow 2 indicates dehydrator D-102B.

4. Figure 4 is a view of the fire scene, as seen looking away from the leak location. Although the pipes, valves and steel structural members were burned and charred, there were no indications of piping or component distortion as a result of blast energy. The items in the fire scene were burned primarily on the sides that faces toward the leak location.