

DEPARTMENT OF TRANSPORTATION



COAST GUARD

MARINE CASUALTY REPORT

**TANK BARGE B-924; EXPLOSION AND FIRE ON
BOARD AT GREENVILLE, MISSISSIPPI ON
13 NOVEMBER 1975 WITH LOSS OF LIFE**

**U.S. COAST GUARD
MARINE BOARD OF INVESTIGATION REPORT**

AND

COMMANDANT'S ACTION

REPORT NO. USCG 16732/63662

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<p>16. Abstract - On 13 November 1975, at approximately 1245 CST (all times local), the tank barge B-924 sustained an explosion and fire during welding repair work while moored at Brent Towing Company Repair Facility at Greenville, Mississippi. The casualty resulted in the loss of four lives and injuries to two other persons.</p> <p>The report contains the U. S. Coast Guard Marine Board of Investigation report and the Action taken by the Commandant to determine the probable cause of the casualty and the recommendations to prevent recurrence.</p> <p>The Commandant concurs with the Marine Board that the probable cause of the casualty was that welding repairs were being undertaken on a tank barge which was not gas free.</p>			
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13 NOVEMBER 1975 WITH LOSS OF LIFE

TABLE OF CONTENTS

	<u>Page</u>
ACTION BY THE COMMANDANT - U. S. COAST GUARD	
Remarks.....	1
Comments on Conclusions.....	3
Action Concerning the Recommendations.....	4
MARINE BOARD OF INVESTIGATION	
Findings of Fact.....	7
Conclusions.....	18
Recommendations.....	21





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26 JUL 1977
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Commandant's Action

on

The Marine Board of Investigation convened to investigate the circumstances surrounding the explosion and fire on board the Tank Barge B-924 at Greenville, Mississippi on 13 November 1975 with loss of life

The record of the Marine Board of Investigation convened to investigate the subject casualty has been reviewed; and the record, including the findings of fact, conclusions, and recommendations, is approved subject to the following comments.

REMARKS

1. Concurring with the Marine Board of Investigation, the cause of the casualty was that welding repairs were being undertaken on a tank barge which was not gas free. This resulted in the ignition of vapors from cargo and cargo residue in the No. 1 starboard wing void which spread fire throughout the forward section of the vessel and ignited volatile vapors causing an explosion. Disregard of federal regulations and unsafe practices on the part of Rex G. Buckley, the marine chemist, and Brent Towing Company, owner of the vessel, resulted in this fatal accident.
2. Under the authority of 46 CFR 30.01-10 the Coast Guard requires repair work on inspected vessels to be accomplished under the direction of the Officer in Charge, Marine Inspection. The Coast Guard inspector acting within the scope of this regulation shall inspect a vessel with regard to the repair work to be accomplished and grant his approval or disapproval as appropriate. If upon this inspection any unsafe conditions are noted the inspector shall require that they be eliminated prior to commencing repair work. In this instance Brent Towing Company did not notify the Coast Guard of any repair work to be undertaken on the B-924 and therefore the work was not accomplished under the direction of the Officer in Charge, Marine Inspection. Had this regulation been adhered to the casualty would have been

prevented. There was cargo residue and free oil in the compartment where the welding work was done and in the adjacent compartments. Attempting hot work within such an environment is inherently dangerous and would not have been allowed by a Coast Guard inspector. Further, the testimony received by the marine board reveals that on a previous occasion the Coast Guard inspector at Greenville, Mississippi had required that a tank barge owned by Brent Towing Company be cleaned when he found it to be in a similar condition to the B-924. This requirement was imposed by the Coast Guard inspector even though the barge had already been certified gas free by Mr. Buckley.

3. Prudent action would not permit welding repairs to be accomplished in a tank which contains flammable cargo and cargo residue. The dangers involved and the risk to life and property are too great to allow hot work under such conditions. Brent Towing Company had the ultimate responsibility to its employees to insure that a safe working environment was present. Regardless of the fact that a marine chemist was on scene the presence of a volatile cargo and cargo residue in the tank to be repaired and in all adjacent tanks should have alerted the company to the inherent dangers. These dangers were magnified in that no attempt was made to clean the areas to be welded. That they chose to proceed with hot work in those spaces is a major contributing factor to the cause of the casualty.

4. Title 33 CFR 126.15(c) requires port facilities that are designated waterfront facilities to obtain approval from the Captain of the Port prior to conducting hot work. Upon notification of a request to do hot work the Coast Guard insures that such operations will be safe with regard to dangers inherent from handling, storing, stowing, loading, discharging, or transporting dangerous cargo. Brent Towing Company failed to request approval for hot work to be performed at their waterfront facility as required by this regulation.

5. Additionally, there were other discrepancies with regard to prudent practice and violation of regulations on the part of Brent Towing Company. At no time during the search for cargo leakage, preparation for repair, or during any repair work on the B-924 was there a gas free certificate issued to Brent Towing Company by a certified marine chemist nor was there any attempt made by the senior officer present to secure copies of a gas free certificate as required by 46 CFR 35.01-1. Employees of Brent Towing Company were allowed to enter cargo spaces and adjacent void compartments on the day prior to the casualty without a test conducted by a competent person as required by 29 CFR 1915.11. The vice president and dispatching officer of Brent Towing Company were both cognizant that unsafe conditions prevailed on the B-924 within an hour of the time of the explosion. No attempt was made at that time to inquire about a gas free certificate or to question why hot work was permitted earlier without the issuance of such a certificate.

6. With regard to Mr. [REDACTED] employment by Brent Towing Company it is noted that his services were obtained for the purpose of testing compartments and issuing a gas free certificate. He was not employed by the company in any other capacity.

7. This marine casualty points to a need to initiate regulatory reform with regard to the regulations pertaining to the responsibilities and inspection and testing procedures of marine chemists, the handling and posting of gas free certificates, and the professional requirements of chemists. Present regulations in this area are inadequate for determining culpability and responsibility. They are also unclear as to procedures to be followed with regard to the preparation, disposition, and handling of the gas free certificate. A marine chemist is not required by federal regulations to adhere to any specific procedures in their inspection and certification of vessels. An industry pamphlet "Standards for the Control of Gas Hazards on Vessels to be Repaired," NFPA 306, has been incorporated into regulation for use as a guide for the marine chemists. This standard sets forth procedures and direction which should be followed by all personnel concerned with gas freeing and hot work on vessels to insure that a safe environment exists. However, as the pamphlet serves as merely a guide strict observance is not mandatory. The marine chemist when issuing a gas free certificate certifies that he has acted in accordance with this standard. The situation exists that regulations require the issuance of a gas free certificate by a marine chemist, who by virtue of this issuance attests that he has followed the requirements of a standard he is not required by regulation to observe. These regulations provide too much discretion with regard to procedures of the marine chemists and to the handling and posting of gas free certificates.

COMMENTS ON CONCLUSIONS

1. With regard to conclusion 2b, it might be argued that the failure to obtain the gas free certificate did not critically contribute to the cause of the casualty. The argument would run: that Mr. [REDACTED] presence in the tank at the time of the explosion implied that had the company demanded a certificate he would have issued it but the accident would still have occurred and further that the chemist's presence during the repair work was an "implied guarantee" of safe conditions. This line of reasoning is not correct. While there is no doubt that the chemist probably believed that conditions were safe enough to work in, he did not issue a certificate which would have categorically established his determination that conditions were safe. The physical issuance of the certificate involves specific procedures in the nature of a checklist. In this case, by the company's failure to obtain a gas free certificate, the marine chemist was allowed to eliminate

some of the steps which could have alerted him to dangers present. The signing of the certificate and its deliverance to the company precludes any implications that may be made and provides evidence that the prescribed safety procedures have been met. Further, the certificate itemizes any qualifications or requirements that must be adhered to in order to maintain a safe condition of the spaces certified throughout the operation. It is the responsibility of the senior officer present to obtain a gas free certificate and to maintain a safe condition on the vessel by full observance of all qualifications and requirements listed on the certificate. By adhering to this regulation the company provides assurance to its employees that a safe working condition exists. Carrying out their responsibilities under regulations indicates that a company takes the reasonable precautions with regard to the safety of their employees.

2. With regard to conclusion 9 Brent Towing Company's failure to notify the Coast Guard of the repair work to be done prevented the repair work being accomplished under the direction of the Officer in Charge, Marine Inspection as required by 46 CFR 30.01-10.

3. With regard to conclusion 10 evidence of violation of 46 CFR 35.01-1 on the part of Brent Towing Company and Mr. [REDACTED] is not concurred with. The NFPA Publication No. 306 serves as a guide and therefore strict observance is not mandatory. However, there is evidence of violation of 46 CFR 35.01-1 on the part of Brent Towing Company and Mr. [REDACTED] in that no gas free certificate was issued nor was there any attempt made by the senior officer present to secure copies of a gas free certificate.

4. With regard to conclusion 17 it is noted that the words "supervision" and "supervisory" are used incorrectly. It is the procedures for the handling of the gas free certificates that were inadequate. The company relied upon the marine chemist for the handling of such certificates.

5. It is further concluded that there is evidence of violation of 18 USC 1115 in that Brent Towing Company through its agents, [REDACTED] (Vice President), [REDACTED] (Dispatcher), and [REDACTED] (Supervisor), knowingly and willfully caused or allowed such fraud, neglect, connivance, misconduct, or violation of law, by which the lives of four persons were lost.

ACTION CONCERNING THE RECOMMENDATIONS

1. The recommendation that steps be taken to publicize the lessons of this casualty is concurred with. A synopsis of this report will be prepared by our Marine Investigation Division and will be published in the Proceedings of the Marine Safety Council with a special emphasis on the volatile nature of crude oil cargoes.

2. The recommendation that a review be made of Coast Guard regulations and the National Fire Protection Association's standards relating to detailed procedures and responsibilities covering the completion and handling of marine chemist's certificates is concurred with. These regulations and standards will be reviewed by our Cargo and Hazardous Materials Division and changes will be made where appropriate.

3. The recommendation concerning the certification of marine chemists and their equipment and the maintenance of related records is concurred with. The review referred to concerning recommendation 2 will consider this recommendation and changes will be made where appropriate.

4. There is evidence of violation of 46 USC 391a on the part of Brent Towing Company in that contrary to 46 CFR 30.01-10 welding was not done under the direction of the Officer in Charge, Marine Inspection.

The recommendation that further investigation under the civil penalty procedures be initiated against Brent Towing Company with regard to the evidence of violation of 46 CFR 30.01-10 is not concurred with. In that possible willful violation of this regulation constitutes evidence of violation of 46 USC 391a this matter should be investigated under the criminal penalty procedures. The Commander, Second Coast Guard District has been directed to forward this case to the Department of Justice.

5. The recommendation that further investigation under the civil penalty procedures be initiated against Brent Towing Company regarding the evidence of violation of 46 CFR 35.01-1 in that no gas free certificate was issued or obtained is concurred with. The Commander, Second Coast Guard District has been directed to initiate further investigation under the civil penalty procedures.

6. The recommendation that further investigation under the criminal penalty procedures be initiated against Brent Towing Company for evidence of violation of 50 USC 191 is concurred with. The Commander, Second Coast Guard District has been directed to forward this case to the Department of Justice regarding the evidence of violation of 50 USC 191.


7. The recommendation that a copy of this report be forwarded to the Department of Labor for their information and possible further action with regard to evidence of violation of their regulations is concurred with. A copy of the report will be sent to the Department of Labor.

8. The recommendation that further investigation be initiated against Brent Towing Company with regard to the evidence of violation of 33 USC 1321 is concurred with. The Commander, Second Coast Guard District has been directed to initiate further investigation under the civil and criminal penalty procedures.

9. The following additional action will be taken.

a. The Commander, Second Coast Guard District has been directed to forward this case to the Department of Justice regarding evidence of violation of 18 USC 1115 on the part of Brent Towing Company.

b. Regulations are being promulgated by our Merchant Vessel Inspection Division concerning the safe entry of men into closed spaces.



O. W. SILER
Admiral, U. S. Coast Guard
Commandant



DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

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16732/Tank Barge
B-924 Marine Board
of Investigation
25 January 1977

From: Marine Board of Investigation
To: Commandant (G-MMI-1/83)

Subj: Tank Barge B-924, O.N. 550414; explosion and fire with loss of
life 13 November 1975 at Greenville, Mississippi

FINDINGS OF FACT

1. On 13 November 1975, at approximately 1245 CST (all times local), the tank barge B-924 sustained an explosion and fire during welding repair work while moored at Brent Towing Company Repair Facility at Greenville, Mississippi. The casualty resulted in the loss of four lives and injuries to two other persons. The monetary damage to the B-924 was \$230,026. Another tank barge, the B-428, which was moored outboard on the starboard side of the B-924, sustained damage of \$38,144. There was additional damage resulting from oil pollution, damage to electrical power lines and damage to telephone lines amounting to an estimated \$20,000.

2. Description of Vessels Involved:

Name:	B-924	B-428
Official Number:	550414	532497
Class:	Tank Barge	Tank Barge
Gross Tonnage:	1698.36	1785
Net Tonnage:	1698	1785
Length:	290 Feet	290 Feet
Breadth:	52.5 Feet	52.5 Feet
Depth:	10.5 Feet	10.5 Feet
Year Built:	1973	1971
Propulsion:	None	None
Homeport:	Greenville, MS	Greenville, MS
Owner:	Brent Towing Company	Brent Towing Company
Address:	P. O. Braver 8 Greenville, MS 38701	P. O. Drawer 8 Greenville, MS 38701
Operator:	Same	Same
Crew:	Unmanned	Unmanned
Last Inspection for Certification:	7 August 1975	11 April 1975
Place of Inspection:	Greenville, MS	Greenville, MS
Cargo for which Certi- ficated:	Grade A and other specified chemical cargoes	Grade A and other specified chemical cargoes
Capacity:	24,400 Barrels	27,150 Barrels

3. The B-924 is a double skin tank barge with six cargo tanks, three on the port side and three on the starboard side. The rake end void had one coat of zinc chromate primer (yellow, Forboil No. 1161) applied during construction of the vessel in 1973. The wing voids, double bottoms, and cargo tanks were not coated. The cargo carried by the B-924 prior to her lay up at Brent Towing Company for repairs was No. 6 oil. The three cargoes previous to that were crude oil.

4. At the time of the casualty the weather was clear with a visibility of 25 miles. Winds were from the northwest at 18 knots, temperature was 52 degrees, dew point 12.8, barometric pressure was 30.27. The weather is not considered to be a contributing factor in this casualty.

5. An analysis taken from the shore tank and submitted by the supplier of the last load of No. 6 fuel oil loaded at Texaco, Inc., Convent, Louisiana on 15 October 1975 aboard the tank barge B-924 is as follows:

- | | |
|--|--------------------------------|
| (1) Gravity API @ 60 F 16.2 | (5) Pour Point + 55 F |
| (2) Bottom Sediment and Water by Centrifuge 0.0% | (6) Sulfur WT., % 0.61 |
| (3) Flash Point 184 F | (7) BTU/LB 18,811 |
| (4) Viscosity Saybolt Second Universal @ 122 F 176.5 | (8) Sediment by Extraction .02 |

6. Results of oil samples taken from B-924 following the explosion on 13 November 1975 are as follows:

<u>Submitted</u>	<u>Location/Sample</u>	<u>Tests</u>	<u>Results</u>
11/15/75	No. 1 double bottom tank		
	Sample #1	Flash Cleveland Open	215°F
	Sample #2	" " "	220°F
12/8/75	No. 1 starboard tank		
	Sample #1	Flash Penske Martin	
		Closed Cup	122°F
	Sample #2	"	120°F
12/30/75	No. 2 Port	Flash Penske Martin	68°F
	No. 3 Stbd	Closed Cup	116°F
	No. 2 Stbd	"	150°F

Some of the above samples were subject to contamination by water and foam and could have contained some No. 6 oil and possibly some crude. The flash point of No. 6 fuel oil is usually 140°F or higher. Commercial standards call for a 140°F minimum flash point. The flash points of 68°F and 116°F on the samples from the Barge B-924 are not typical for No. 6 oil. Explosimeter readings taken from tanks on 19 December 1975 at Baton Rouge, Louisiana were:

No. 2 Port
No. 2 Stbd
No. 3 Stbd

In explosive range
15% of the lower explosive limit
0

7. Record of dead and injured:

a. Dead:

(1) Rex Goring Buckley, Marine Chemist; date of birth [REDACTED]
[REDACTED] social security no. [REDACTED] address, [REDACTED]
[REDACTED]; next of kin - wife - Mrs. [REDACTED]
[REDACTED] Mr. Buckley
was retired from Union Carbide Company, Charleston, West Virginia and
had been working in Greenville, Mississippi as an independent contract
chemist for the past two years.

(2) Robert Earl McNemar, Leaderman; date of birth [REDACTED]
[REDACTED] social security no. [REDACTED]; address, [REDACTED]
[REDACTED]; next of kin - mother - [REDACTED]
[REDACTED]. Mr. McNemar was employed
by Brent Towing Company off and on since 8 December 1970.

(3) Jack Kennedy Riley, Sr., Laborer; date of birth [REDACTED]
[REDACTED] social security no. [REDACTED] address, [REDACTED]
[REDACTED]; next of kin - wife - [REDACTED]
[REDACTED] Mr. Riley had been employed by
Brent Towing Company since 12 November 1975. He had been previously
employed as a home carpenter.

(4) Sidney Vaughn, Jr., Welder; date of birth [REDACTED];
social security no. [REDACTED]; address, [REDACTED]
[REDACTED]; next of kin - wife - [REDACTED]
[REDACTED]. Mr. Vaughn had been employed by Brent
Towing Company off and on since 13 December 1970. He had also been
employed by Greenville Shipbuilding Corp. off and on from 1967 to 1974.

b. Injured in excess of 72 hours:

(1) [REDACTED], Leaderman; date of birth [REDACTED];
social security no. [REDACTED]; address, [REDACTED]
[REDACTED]. He had been employed by Brent Towing Company off and on
since 13 December 1970, and permanently since 13 November 1973.

(2) [REDACTED], Laborer; date of birth [REDACTED];
social security no. [REDACTED] address, [REDACTED]
[REDACTED] He had been employed by Brent Towing Company since
1 September 1975, and had formerly been employed as a house painter.

c. None of the above dead or injured held a Merchant Mariners Document at the time of the fire and explosion.

8. On 3 November 1975 the B-924 arrived at the General American Transportation Corporation Terminal (GATX) at Bedford Park, Illinois for the purpose of unloading cargo for Torco Oil Company. At this time GATX informed Torco Oil Company of a broken No. 1 port steam coil. Mr. [REDACTED] of GATX notified Mr. [REDACTED] of Brent Towing Company, Inc., Greenville, Mississippi of this problem by telephone and by a letter dated 5 November 1975 and requested that the necessary repairs be made. Mr. [REDACTED] of GATX Terminals Corporation confirmed that No. 6 oil was noted leaking out of a condensation line on 3 November 1975 when steam was applied. There is no evidence of any report of cargo leakage or of any crack in any cargo tank at this time.

9. Brent Towing Company ordered the B-924 to be returned to Greenville, Mississippi for repairs. On 7 November 1975 the M/V RUTH BRENT took the empty B-924 and two other empty barges in tow from the M/V MAGNOLIA at mile 79 on the Illinois River near the La Grange Lock. The operator of the M/V RUTH BRENT, [REDACTED], was instructed to drop the B-924 at Greenville, Mississippi for repair work. Mr. [REDACTED] did not have any knowledge of the nature of repair work to be done. On the voyage from mile 79 to Greenville, Mississippi the tanks and voids of the B-924 were not inspected. At approximately 2215 on 11 November 1975, a towboat owned by Waterways Marine Company took custody of the B-924 at Greenville, Mississippi and delivered the vessel to the Brent Towing Company repair facility on 12 November at approximately 0715. Brent Towing Company is located on the east bank of Lake Ferguson near Greenville, Mississippi, 2.25 miles north of the entrance to the lake.

10. The B-924 was moored port side to the dock alongside a permanently moored vessel used for stripping cargoes from other vessels. The tank barge B-428 was moored port side to the B-924. Both barges were scheduled for welding repair work on the morning of 13 November. The Coast Guard was not notified of the repair work to be done on the two barges. On 12 November preparations were made for the repair work consisting of placing blowers over the ullage openings on the two barges.

11. At approximately 0830 on 13 November Mr. [REDACTED], a certified marine chemist arrived at Brent Towing Company. Mr. [REDACTED] was the holder of a valid marine chemist certificate issued by the National Fire Protection Association and thereby was established as a person qualified to determine whether construction, alteration, repair, or shipbreaking to vessels which may involve hazards covered by the NFPA standards could be undertaken with safety. He was informed by the facility supervisor, Mr. [REDACTED] that welding repairs were to be made on the B-924 and

B-428. Mr. [REDACTED] obtained a history of the cargoes from the operations dispatcher of Brent Towing Company, Mr. [REDACTED]. The marine chemist's purpose for being on board the B-924 and B-428 was to insure that the two vessels were safe for men and fire and to issue gas free certificates to Brent Towing Company to allow welding repair work to be done. A gas free certificate is a written statement in a form and manner prescribed by the NFPA stating the conditions which the marine chemist finds on a vessel at the time of his inspection. At approximately 1000 on 13 November the marine chemist was noticed by Mr. [REDACTED] filling out gas free certificates. Identification of which vessels the certificates were completed for was not ascertained. At this time there were no gas free certificates issued by Mr. Buckley to any employee of Brent Towing Company nor was there one posted on the B-924 or B-428.

12. According to testimony from Brent Towing Company personnel, Mr. [REDACTED] usual procedures for issuing gas free certificates were to make four copies and deliver one copy to the office, post one on the vessel, and retain the remaining two copies. However, there was no set rule or practice for the handling and/or posting of gas free certificates prescribed by either Brent Towing Company or by the marine chemist. The employees were under instructions never to perform any hot work on a vessel unless there was a gas free certificate posted on the vessel and they had also been told to follow the instructions of the marine chemist at all times when he was on scene and when work was being performed. The policy of the company with regard to the relationship with the marine chemist led employees to believe that working conditions were safe by the presence of the chemist. However, Mr. [REDACTED] was not an employee of Brent Towing Company and had no obligation nor responsibility to that company other than those called for by his services as a contract marine chemist.

13. Prior to 1100 on 13 November the cargo was pumped out of the No. 1 wing voids and into the No. 1 starboard cargo tank and air pressure was applied to the No. 1 port cargo tank. There was no evidence found that the tank had a leak. At approximately 1100 on 13 November the cargo was then pumped from the No. 1 starboard cargo tank to the No. 2 port cargo tank so that they could check for a leak in the No. 1 starboard cargo tank. At the direction of Mr. [REDACTED] a leaderman who had been working on the tank barge B-224 on the drydock, went aboard the B-924 to assist in locating the leak. He entered the No. 1 starboard wing void and found air leaking through a horizontal crack approximately 1 inch long. The crack was located about 20 feet aft of the forward rake bulkhead on the outboard side about 3 inches up from the tank floor at the turn of the bilge. At the time Mr. [REDACTED] entered the No. 1 starboard wing void there was approximately 6 inches of cargo at the after bulkhead and residue covered the entire compartment.

14. While the cargo was being pumped from the No. 1 starboard cargo tank into the No. 2 port cargo tank, and while checking for the leak, welding repairs had begun in the No. 1 port cargo tank on the leaking steam line. The fractured steam line was located about 2 feet forward of the after bulkhead. The welding repair was to a fracture in the steam line, at the elbow, approximately 1/2 inch long. This repair was accomplished by a repair team consisting of [REDACTED], marine chemist; [REDACTED], leaderman; [REDACTED], welder; and [REDACTED], laborer. The cargo residue in way of the steam coil fracture was cleaned up with rags. There is no indication that a sand blanket or asbestos sheeting was used in way of this repair work. The work was conducted while the adjacent tank, No. 2 port cargo tank, contained the cargo which was pumped out of No. 1 starboard cargo tank and while some cargo and residue remained in the adjacent void spaces and in the No. 1 starboard cargo tank. This repair was completed at approximately 1130 on 13 November.

15. During the morning hours all shifting of free oil was done between adjacent tanks on the B-924 and no residue or cargo was pumped off the barge. The shifting of the cargo was done with a 3 inch quick connecting Wilden air pump, model M15, by dropping a hose through ullage openings into the tanks and taking suction and transferring to another tank. No cargo lines were used for shifting oil.

16. No welding repair work was begun on the crack in the No. 1 starboard cargo tank prior to lunch time because the conditions were not safe in that compartment for that type of work. Aboard the B-924 at approximately 1130 on 13 November Mr. [REDACTED] had declared to Mr. [REDACTED] that the oil was too close to the crack in the No. 1 starboard cargo tank and that he wanted it pumped back away from the working area. He also told Mr. [REDACTED] that there was an odor in that compartment that he did not like. During the lunch period the gas chemist, [REDACTED], went to the Brent administration office around 1145 on 13 November and told Mr. [REDACTED], Dispatcher, that the barges were "pretty hot." Mr. [REDACTED] ask if they should be "buttoned up and taken south." This was a reference to taking the barges south, usually to Baton Rouge, where tank cleaning facilities are available. Mr. [REDACTED] told Mr. [REDACTED] he "thought he could get at them with the blowers." There were no other witnesses to this conversation and Mr. [REDACTED] did not report this conversation to anyone else prior to the explosion. While at the office, Mr. [REDACTED] also mentioned to Mr. [REDACTED], Vice President, that the B-924 was "pretty hot" to work on.

17. At approximately 1200 on 13 November all personnel ceased work and went to lunch. The blowers were left operating during this period. There were blowers on the No. 1 and No. 2 butterworth openings on the No. 1 starboard cargo compartment, and on the opening into the No. 1 port wing void compartment. There was no blower on the No. 1 starboard wing void compartment.

18. At 1230, 13 November, employees of Brent Towing Company and the marine chemist returned to the B-924 to continue work. [redacted] the marine chemist; [redacted] leaderman; [redacted], welder; and [redacted], laborer; entered the No. 1 starboard cargo tank at this time to repair the crack in that tank. At approximately the same time these four men entered the No. 1 starboard cargo tank, [redacted] leaderman and [redacted] laborer, entered the No. 1 starboard wing void to act as fire watch on the opposite side of the bulkhead where the welding of the crack was to be performed. Neither of these two men had ever stood a fire watch before and neither knew the type of fire extinguisher they were using.

19. The condition of the B-924 at the time the men entered the spaces to begin the repair work was as follows: the No. 1 starboard cargo tank had an estimate of from 1 to 2 inches of oil on the bottom for a radius of about 6 feet from the opening of the cargo discharge line and the entire tank was covered with oil residue. The bottom and internals of the wing voids and the double bottom in way of the No. 1 cargo tanks were coated with oil residue. There was several inches of oil, increasing in depth to approximately 6 inches toward the after bulkhead, on the bottom of the No. 1 starboard wing void. The No. 1 port cargo tank was coated with oil residue and the No. 2 port cargo tank contained cargo which had been previously pumped out of the No. 1 starboard cargo tank. The barge was grounded with a bonding strap.

20. Preparations for welding inside the No. 1 starboard cargo tank consisted of wiping clean a small area around the crack that was to be welded. There was no protective material such as a sand blanket or asbestos sheeting placed under the welding area on either side of the bulkhead. No cleaning or preparation of any kind was done in the area of the crack in the No. 1 starboard wing void. The welding area on the wing void side of the bulkhead was coated with oil residue. There is no evidence that combustible gas readings were taken in the No. 1 starboard wing void just prior to commencing welding repairs. There were no communications set up between the two adjacent compartments where work was being performed.

21. The following equipment and or appliances were being used at the time the repair work was commenced on the crack in the No. 1 starboard cargo tank:

<u>Name</u>	<u>Type</u>
a. Welding machine	Hobart R300, Output: 300 Amps., 40 volts, no load voltage 77 duty cycle 60%. Input: 230/460 volts, 58/29 Amps., phase 3-60 cycles.
b. Electrode holder	Hobart
c. Welding rod	Fleetwood 5P conformed to AWS A5.1 ASME SFA A5.1 E6010 - 5/32D - 622B
d. Ventilation blowers	20" aluminum fan, AC, in rubber insulated aluminum frame manufactured by Williamson Manufacturing and Machine Works Co., Greenville, MS. The blower motor was a NEMA frame 56, Rigid mount - explosion proof motor - 1/3 HP - 1725 RPM, 115/230 volts, AC-capacitor start, automatic terminal protected. Fan cooled full load amps. 6.4 at 115 volts, Dayton stock no. 6K036.
e. Portable air pump	Wilden pump, air operated double diaphragm, model M 15 B, spark free with 60 PSIG inlet pressure and 80 SCFM air consumption, water discharge is 104 GPM against a head of 36 PSIG.
f. Fire extinguishers	Type B, portable, 15 lb., CO-2, make: unknown due to damage.
g. Flashlight	Hand held Eveready No. 108, with no classification markings, powered by one 6-volt dry cell battery.
h. Combustible gas indicator	Manufactured by Mine Safety Appliance Co. The exact model number cannot be determined due to the damaged condition. The company has advised that in all probability it is either model 20, 21, 30 or 40. All of these models provide a battery condition check capability on the instrument panel. A check position is marked for a control knob and a check reading is marked on the scale of the meter. The instructions state that the meter pointer must be adjusted to the check position by means of the voltage adjustment knob. If it is impossible to set the voltage to the check position, the batteries must be replaced.

22. At approximately 1235 on 13 November, Eddie Skelton, fitter; Michael Lee Lacey, welder/tacker; and Clifford Riley, painter; lowered a fire extinguisher and the welding lead through the forward most butterworth hatch on the No. 1 starboard cargo tank to the repair team. They slid the blower out of the way just enough to allow the leads to pass down the hatch. The welding lead was not lowered all the way to the bottom of the tank as they did not want it to get in the oil residue which coated the tank bottom. These three employees then walked to the forward end of the barge and began talking.

23. [REDACTED] was standing inside the No. 1 starboard wing void on the bottom longitudinals holding a fire extinguisher and [REDACTED] was between Mr. [REDACTED] and the manhole opening into that compartment. They could hear the repair team moving on the other side of the bulkhead. Mr. [REDACTED] and Mr. [REDACTED] had been standing in the wing compartment for about 5 or 10 minutes when they noticed the area around the crack begin to glow and sparks started spitting through into the void. Approximately 4 seconds after the glow was noticed the sparks started to flare and Mr. [REDACTED] used the fire extinguisher. The discharge from the fire extinguisher had no effect on the sparks and the entire void became engulfed in flames. At this point Mr. [REDACTED] dropped the fire extinguisher and ran for the ladder to escape up the manhole just behind Mr. [REDACTED] who was also escaping the void. Neither person heard an explosion prior to the fire.

24. Upon leaving the No. 1 starboard wing void Mr. [REDACTED] and Mr. [REDACTED] ran aft on the barge. On seeing flames coming out of the openings in the No. 1 starboard cargo tank and No. 1 starboard wing void the three employees who were on the forward rake end, Mr. [REDACTED], Mr. [REDACTED] and Mr. [REDACTED] began running aft on the barge. At this time, a large explosion occurred which knocked Mr. [REDACTED], Mr. [REDACTED], and Mr. [REDACTED] into the water off the starboard side of the vessel and knocked Mr. [REDACTED] to the deck of the barge. [REDACTED], laborer, who was descending the ladder off the side of the port stern of the barge B-924, began to run away from the stern of the vessel upon hearing the explosion. He then heard a yell for help and returned to the vessel and helped Mr. [REDACTED] off the barge and to safety. The three employees that were knocked into the water were able to swim clear of the fire and to safety. The four members of the repair team were inside the No. 1 starboard cargo tank at the time of the explosion and there is no evidence that they had any chance to escape from the tank.

25. The explosion resulted in the forward No. 1 port and starboard wing bulkheads being forced forward. The force of the explosion blew most of the rake away from the barge in three sections, depositing a section of the internals on top of the barge B-428, a section of the knee part of the rake approximately 300 yards away in a roadway, and a part of the

deck section of the rake about 500 yards away on an upper roadway. The No. 1 port and starboard cargo tank forward bulkheads were forced aft. The forward section of the B-924 became engulfed in flames immediately.

26. At about 1240 the Coast Guard Cutter PATOKA passed Brent Towing going south in Lake Ferguson enroute to service aids to navigation. When the barge exploded, the Officer in Charge of the CGC PATOKA sounded the general alarm, launched a small boat to look for survivors and proceeded to the scene of the fire and explosion arriving at 1250. The PATOKA nosed against the B-428 and activated her fire fighting equipment. At the same time the PATOKA crew severed the forward lines and pulled the B-428 away from the B-924. The PATOKA, being underpowered for this size barge, held the B-428 away until the M/V MISS KATHY, operated by Mainstream Shipyard Corporation, arrived on the scene and took the B-428 in tow and secured it on the bank.

27. The PATOKA came along the outboard side of the B-924 and commenced to pump foam into the barge. They also used high velocity fog on the deck to permit people to move on the barge. At about 1350 the fire came under control. The CGC PATOKA used 1300 gallons of foam, some of which was provided by the Greenville, Mississippi Fire Department that had responded from the shore side at approximately 1300.

28. The U. S. Corps of Engineers harbor workboat, M/V ROCHE, arrived on scene about 15 minutes after the explosion and directed water in the area of the bow of the B-924. The ROCHE was not equipped with a radio with marine frequencies and this resulted in poor coordination of firefighting efforts between the ROCHE and the PATOKA. The ROCHE was using water only directed from a barge flat using a 671 diesel engine putting out 1200 gallons per minute. The ROCHE has since been equipped with a radio carrying common marine frequencies. The ROCHE's efforts reportedly resulted in some of her water diluting some of PATOKA's foam. The M/V MISS KATHY, after securing the B-428, rejoined the CGC PATOKA and the M/V ROCHE and assisted as directed by the CGC PATOKA to fight the fire using water with her 40 hp and 20 hp fire pumps with a capacity of 220 gallons per minute and 100 gallons per minute respectively. The fire was completely extinguished at 1425.

29. After the fire had been extinguished the remains of the bodies of the four man repair team were found in the No. 1 starboard cargo tank. The body recovery operation was under the direction of the Washington County Sheriff's Rescue Squad. Death certificates for all four men issued by [REDACTED] Coroner, Greenville, Mississippi, listed the cause of death as multiple injuries and burns due to a barge explosion. [REDACTED] sustained severe burns and was admitted to Kings Daughters Hospital, Greenville, Mississippi on the afternoon of the casualty. He

returned to work fully recovered on 3 February 1976. [REDACTED] sustained severe burns and was admitted to the Delta Medical Center, Greenville, Mississippi on the afternoon of the casualty. He returned to work fully recovered on 16 February 1976. There were no other reportable personal injuries or deaths resulting from this casualty.

30. The B-924 sustained extensive damage to its forward section amounting to \$230,026. The B-428 had a section of its port bow set in which amounted to damage of \$38,144. Approximately 75 gallons of oil were spilled into Lake Ferguson as a result of the explosion and fire. There was also damage to several electrical power and telephone lines.

31. A gas free certificate for the B-924 was found in Mr. Buckley's car the day after the casualty in a working case by a Coast Guard investigating officer. The certificate was dated 13 November 1975, for 11:30 a.m. It indicated that hotwork could be conducted in the No. 1 port and starboard cargo tanks under the supervision of the undersigned and the certificate was signed "Rex Buckley." At no time during the course of events prior to and including the time of the casualty was a copy of this certificate delivered to any employee of Brent Towing Company nor was one posted on the B-924.

32. Testimony by a certified marine chemist and a representative of the National Fire Protection Association (NFPA) indicates that the normal procedure for the handling of a gas free certificate is for the marine chemist to deliver the necessary copies to the appropriate owner, or his representative, of the vessel being certified who in turn will post the certificate on the vessel. There are no Federal rules or regulations which speak to the handling of these certificates by the marine chemist other than the requirement that such a certificate is to be issued to an owner or his representative prior to starting repair work. Title 46 CFR 35.01-1a requires that NFPA publication No. 306, Standard for the Control of Gas Hazards on Vessels to be Repaired, shall be used as a guide with regard to the issuance of gas free certificates. This publication states that it is the responsibility of the vessel repairer to secure copies of gas free certificates and further states that no repairs shall be undertaken until a gas free certificate is obtained. Title 46 CFR 35.01-1d requires that the senior officer present shall be responsible for securing copies of gas free certificates.

CONCLUSIONS

1. The proximate cause of the casualty was that welding repairs were being undertaken on a tank barge which was not gas free. This resulted in the ignition of cargo residue in the No. 1 starboard wing void from welding sparks which spread fire throughout the forward section of the vessel and ignited volatile vapors causing an explosion.
2. Contributing to the cause of this casualty were the following:
 - a. The compartment where repair work was performed and adjacent compartments contained some amounts of cargo and cargo residue consisting of a mixture of crude oil and No. 6 oil.
 - b. The failure of Brent Towing Company to insure a safe working environment for their personnel by obtaining a gas free certificate for the B-924 prior to allowing welding repair work to commence.
 - c. The failure of Brent Towing Company to notify the Coast Guard of the repair work to be done.
 - d. The failure of the marine chemist and Brent Towing Company to follow the provisions of the National Fire Protection Association publication No. 306 which sets forth procedures to be followed prior to beginning welding repairs on tank barges.
3. Mr. Rex G. Buckley, marine chemist, and Brent Towing Company employees, Mr. Robert E. McNemar, Mr. Jack K. Riley, and Mr. Sidney O. Vaughn died as a result of this casualty.
4. Mr. [REDACTED] and Mr. [REDACTED] employees of Brent Towing Company, sustained injuries resulting in their incapacitation in excess of 72 hours as a result of this casualty.
5. The cause of the 1 inch crack in the No. 1 starboard cargo tank is unknown.
6. The gas free certificate for the B-924, found in Mr. Buckley's car on 14 November 1975, was not valid in that it had not been delivered to Brent Towing Company and that it was dated 13 November 1975 at 11:30 a.m., approximately the same time the marine chemist informed personnel of Brent Towing Company that the barge was not safe to work.
7. The men assigned to fire watch duties in the No. 1 starboard wing void were not adequately trained to perform the functions of a fire watch.

8. There is evidence of violation of 18 USC 1115 in that Mr. Rex G. Buckley, a certified marine chemist, knowingly and willfully caused or allowed such fraud, neglect, connivance, misconduct, or violation of law, by which the lives of four persons were destroyed.
9. There is evidence of violation of 46 USC 391a on the part of Brent Towing Company in that contrary to 46 CFR 30.01-10, welding was undertaken without first notifying the Officer in Charge, Marine Inspection.
10. There is evidence of violation of 46 CFR 35.01-1 on the part of Brent Towing Company and Mr. Rex G. Buckley in that neither party used the NFPA publication No. 306 as a guide to the procedures to be followed prior to beginning welding repair work on the B-924.
11. There is evidence of violation of 50 USC 191 on the part of Brent Towing Company in that no approval was either requested of or granted by the Captain of the Port, Memphis, Tennessee, for any welding or hot work to be done at the Brent Towing Company facility as required by 33 CFR 126.15(c).
12. There is evidence of violation of 29 CFR 1915.11 on the part of Brent Towing Company in that employees were allowed to enter cargo spaces having contained flammable liquids in bulk prior to such compartments being tested by a competent person to insure that it was safe to do so.
13. There is evidence of violation of 29 CFR 1915.13 on the part of Brent Towing Company in that welding repair work was allowed without obtaining a gas free certificate for the vessel.
14. There is evidence of violation of 29 CFR 1915.12b on the part of Brent Towing Company in that the flashlight used in the No. 1 starboard cargo tank was not explosion proof.
15. There is evidence of violation of 33 USC 1321 on the part of Brent Towing Company in that oil was spilled into Lake Ferguson as a result of this casualty.
16. The policy of Brent Towing Company with regard to the relationship between their employees and the marine chemist and the employees reliance on the marine chemist as a supervisor was unsound and faulty in that the employees became reliant upon a person who owed no obligation nor responsibility to Brent Towing Company as a company employee.

17. The business procedures of Brent Towing Company with respect to their relations with the marine chemist were inadequate in that the obtaining, supervision, and control of gas free certificates was not provided for by the company. Brent Towing Company relied upon the marine chemist for supervisory duties in this matter.

18. Present Coast Guard regulations covering the responsibilities and conditions for issuing, handling, and posting gas free certificates are inadequate and unclear as to the exact procedures to be followed.

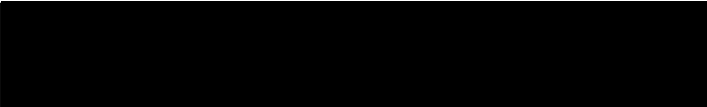
19. The prompt and effective actions by the CGC PATOKA in responding to the casualty minimized the damage to the tank barges B-924 and B-428.

20. There is no evidence that any personnel of the Coast Guard or any other government agency caused or contributed to the cause of this casualty.



RECOMMENDATIONS

1. That steps be taken to publicize the lessons of this casualty in an effort to improve public awareness of the volatile nature and flammability hazards associated with crude oil cargoes.
2. That a review be made of Coast Guard regulations and the National Fire Protection Association's standards relating to detail procedures and responsibilities covering the completion and handling of Marine Chemist's Certificates.
3. That the certification of marine chemists and their equipment be considered at frequent and regular intervals with satisfactory records being maintained by the Coast Guard or NFPA. Regular physical and professional examination of the marine chemists with Coast Guard or NFPA maintained records is recommended. Records, as appropriate, should be maintained at frequent intervals on test and calibration of equipment and verified by the Coast Guard or NFPA.
4. That since Mr. Rex G. Buckley, certified marine chemist, is deceased, that no further action be taken regarding violation of 18 USC 1115.
5. That further investigation under the administrative penalty procedures be initiated against Brent Towing Corporation regarding the violation of 46 CFR 30.01-10.
6. That further investigation under the administrative penalty procedures be initiated against Brent Towing Company regarding the evidence of violation of 46 CFR 35.01-1.
7. That further investigation under criminal penalty procedures be initiated against Brent Towing Company for evidence of violation of 50 USC 191.
8. That a copy of this report be forwarded to the Department of Labor Occupational Safety and Health Administration regarding evidence of violation of 29 CFR 1915.11, 29 CFR 1915.12b and 29 CFR 1915.13.
9. That further investigation under the administrative penalty procedure be initiated against Brent Towing Corporation regarding the evidence of violation of 33 USC 1321.

10. That this case be closed.


Captain R. K. SIMONDS, USCG
Chairman


Commander B. G. BURNS, USCG
Member


Lieutenant Commander , USCG
Member and Recorder



