



COAST GUARD

SUNKEN TANKER

PROJECT REPORT

DEPARTMENT OF TRANSPORTATION

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I. Introduction:

Following the grounding of the tanker TORREY CANYON and the subsequent extensive pollution of the coasts of Europe, President Johnson, on 26 May 1967, asked the Secretaries of Interior and Transportation to undertake a study to determine how best to mobilize the resources of the Federal Government and the nation to meet the problem of oil pollution. As a part of this study, the Secretary of Transportation directed the Commandant of the Coast Guard to contract for the investigation of one or more tankers sunk on the United States continental shelf by enemy action during World War II. Coast Guard authority to carry on such a project is based upon 14 U.S.C. 2, 88 and 92 pertaining to marine and navigational safety and is a logical corollary to the Coast Guard responsibilities in the administration and enforcement of the Oil Pollution Acts of 1924 and 1961 and the Refuse Act of 1899 (33 U.S.C. 431-437, 33 U.S.C. 1001-1015, and 33 U.S.C. 407 respectively). Further, benefits of such a project would increase the knowledge base of the Coast Guard concerning the undersea environment and its hazards envisioned for its future role and responsibilities relating to continental shelf safety involving undersea search and rescue and aids to undersea navigation. The tankers, most of which were carrying cargoes of petroleum products when sunk, were considered to pose a potential and substantial threat of pollution to the American shoreline should they still contain their cargoes and be in a position to release them as a result of the natural deterioration of their hulls.

Due to the extraordinary potential liability to third parties which might have resulted from an inadvertent release of oil, during the hull investigations, the contractor required liability coverage. Being unable to acquire insurance coverage at a reasonable premium to cover such an eventuality, the contractor would not proceed with the project without assurance of indemnification against such loss or damages that might be incurred. The Secretary of Transportation, on 12 August 1967, authorized assumption of liability by the Government (U.S. Coast Guard) by a Memorandum of Decision, under an Act of Congress dated 28 August 1958. The contractor agreed to assume to the first \$500,000 liability either by self-assumption or by insurance. A provision to this effect was included in the contract.

II. Description of Project:

The sunken tankers GULFTRADE, R.P. RESOR, VARANGER and COIMBRA were investigated by underwater inspection methods. Although complete assurance of their present conditions could never be made without a physical investigation of every vessel sunk, those already examined represent a useful variation of possible hull conditions. The GULFTRADE and R.P. RESOR are so battered that they are unable to retain any cargo. The VARANGER has its tanks intact but open to the sea. The COIMBRA's tanks are in good condition and appeared to be closed to the sea and yet even her cargo has somehow been released over the years, leaving only the slightest traces of residual oil. Attempts to penetrate the hull of the COIMBRA failed, and indicate that corrosion has not occurred to an extent which would allow a mass release of entrapped petroleum. Best estimates are that the oil has escaped by rising through the tank ventilation systems.

This would most likely have occurred gradually over an extended period of time, allowing the oil to be assimilated by the surrounding sea through bio-degradation of the persistent oils and evaporation of the volatiles to the atmosphere from the non-persistent oil cargoes. Metal samples were taken from each of the vessels investigated. These samples were analyzed by the Naval Research Laboratory, and although information as to the original steel type, thickness and condition at the time of sinking is not known, no unusual corrosion phenomenon was observed. Steel of the type analyzed, and similar to the metal samples taken, has been generally observed to corrode at a rate of .005 inches per year in clean sea water.

The thickness of hull plating on tankers frequently ranges from 5/8 to 1 inch. Thus, it can be seen that in a theoretical maximum of 125 years 5/8 inch plating would completely disintegrate. However, a number of variables affect corrosion including: the presence of dissimilar metals, galvanic action formation of oxygen concentration cells, the presence of aerobic or sulfate reducing bacteria, sea growth and the mechanics of the corrosion process itself. These factors may result in deterioration or localized pitting at a rate of .05 inch per year. Mechanical damage suffered during the enemy attack may also be a factor. It is possible therefore that the release of entrapped oil cargoes due to hull corrosion could have occurred in the period between sinking and this investigation.

No oil was found in sufficient quantities for analysis.

III. Pre-operation Planning.

A. Coordination with Navy Ship Salvage and use of Navy Contract.

The U. S. Coast Guard requested the assistance of the Supervisor of

Salvage, Navy Ship System Command, for the project. Arrangements were made to use the existing Navy Contract with Ocean Systems, Inc. (OSI) for the diving survey and inspection. This obviated the time delay necessary to let a Coast Guard contract which would have carried the project's operational phase into the approaching hurricane season. Planning was further coordinated with Commander, Third Coast Guard District, the prospective operational commander, when the target location was decided.

B. Four Phase Project Initiated.

It was decided to divide the project into four phases including: (1) selecting and locating a sunken tanker, (2) underwater surveying and inspecting, (3) acquiring samples of structures and fittings and (4) analysing the information and samples taken to determine the extent and immediacy of any pollution threat.

I. Selection of Target Tankers.

Selections of the target vessels were made by studying all known lists of merchant vessels lost during World War II and plotting those off the East Coast of the United States. Of the 148 American tankers known to have been casualties of enemy action during World War II, 105 were attacked in the Atlantic or Gulf of Mexico. Of these, only 27 had been sunk with petroleum cargo in less than 200 feet of water. The 200 feet criterion was selected on the basis of the maximum depth desirable because of operational difficulties, costs and distance from the coast line. Each of the 27 tankers was then evaluated, taking into consideration such factors as: depth of water, type of cargo, whether or not there was an extensive fire or loss of oil by torpedoing or gunfire before sinking, distance offshore, and sea currents and

physical conditions which would affect diving operations. As a result of this evaluation, the stern section of the GULFTRADE and the R.P. RESOR, both lying off the coast of New Jersey, were chosen as initial targets. The expressed concern of the people of the area, high volume of marine traffic, extensive recreational beaches, high population density, significant recreational boating and fishing, and marine wild life all pointed to the New Jersey and Long Island shore areas as the initial areas for investigation.

C. Operational Command Established and Duties Delegated.

The Commander, Third Coast Guard District, New York, New York, was designated as operational commander, and was delegated the responsibility for: administrative, technical and logistic support, on-scene safety patrol, contingency planning for diver casualty and inadvertent oil release, issuance of notices to mariners to advise vessels of the project, handling public information and daily situation reports (SITREPS) of operational progress. In performance of these duties a safety patrol vessel was maintained on-scene during all diving operations. In the event of a diver casualty, a helicopter was available to evacuate the diver to one of three decompression chambers in the area, the Philadelphia Navy Yard, U.S. Submarine Base New London, and Mount Sinai Hospital in New York City. A quantity of oil emulsifier was purchased and kept aboard the safety patrol vessel to be used to disperse the oil in the event of an inadvertent release during the undersea physical investigation of the hulls. Communications were maintained between the CGC SWEETGUM and the Third Coast Guard District with the latter relaying daily SITREPS to the Commandant.

I. Search for stern of GULFTRADE and RESOR.

The operational commander also coordinated a preliminary search of the plotted positions of the stern of the GULFTRADE and the R.P. RESOR in order to minimize delay of beginning at-sea operations of the CGC SWEETGUM. During the week prior to the scheduled beginning of diving operations, (7-14 August) vessels assigned to the Third Coast Guard District and United States Navy ships and aircraft conducted underwater search to locate these hulls whenever they were operating in the areas of sinking. Cooperation of CINCLANTFLT was required. The CGC TAMAROA made an extensive search of both areas and made several sonar contacts, two of which were the most likely targets based on charted positions. The CGC SWEETGUM later determined the positions with further accuracy.

2. CGC SWEETGUM Assigned to Project.

During the initial planning phase, Ocean Systems, Inc., requested the use of a Coast Guard buoy tender as the diving platform best suited for the project and as means of minimizing total costs. The tender SWEETGUM was designated and equipped with phone patch equipment for use by the contractor. The working spaces on the buoy deck and the boom arrangements were ideally suited for such operations and had been successfully used in the underwater work on the DANIEL C. MORREL sunk in Lake Huron in January 1967.

3. Coast Guard Diving/Liaison Officer Assigned.

The contractor also requested that a qualified Coast Guard diving officer be assigned to the project to act as liaison officer between the vessel's Commanding Officer and the OSI project officer on board. LTJG

Joseph J. McClelland, Jr., of the CGC WESTWIND was temporarily assigned to the CGC SWEETGUM for this purpose and made dives on each tanker investigated.

4. Survey Plan.

The contractor was responsible for operational planning involving location of the target vessel and taking samples of the vessel and cargo. The Navy agreed to analyze any oil or hull samples obtained. Arrangements were made with the Philadelphia Navy Yard and with the Naval Research Laboratory, respectively, for this work. A preliminary report from OSI outlined the process by which the hull investigation would be conducted and the equipment to be used. Loran and Decca Hifix electronic navigation systems were to be used to locate the charted positions of the target. A two-mile square search area would then be laid out and an underwater grid search conducted making concurrent use of fathometer and side scanning sonar. Once a target vessel was located, divers would take video tape pictures of the tanker with simultaneous monitoring on the SWEETGUM. Also provided was the capability for photographic recording for later viewing. After determining the hull thickness with ultrasonic gauging equipment, a stud gun and plug would be used to penetrate the hull and sample the cargo.

IV. Operations:

A. Preliminary Preparations.

On 7 August 1967, after loading "hard hat" and scuba diving equipment belonging to Ocean Systems, Inc., the CGC SWEETGUM sailed from its home port of Mayport, Florida for operations, anticipated to last three weeks, off the coast of New Jersey. The vessel arrived at United States Coast

Guard Base, St. George, New York on 9 August where final preparations for at-sea operations were made. These included loading additional equipment and embarking 11 civilian employees of Ocean Systems, Inc. and the Coast Guard diving officer. On the afternoon of 13 August the SWEETGUM departed Base St. George for the plotted position of the stern section of the GULFTRADE to begin its search at first light on Monday 14 August.

B. Survey of GULFTRADE, stern section.

The CGC SWEETGUM anchored over the stern of the GULFTRADE at 1500Q on 14 August 1967. A two point moor was set using the vessel's starboard anchor forward and a second class num buoy astern. The target was located in 72 feet of water at $39^{\circ} 49' N.$ $73^{\circ} 50' W.$ Divers found the hull of the GULFTRADE to be demolished with its cargo spaces wide open. Rivets had been corroded away by the sea permitting hull plates to separate. This condition may have been caused by the original torpedoing, subsequent demolition by the U.S. Army, Corps of Engineers to remove the superstructure as a hazard to navigation, twenty-five years of exposure to the sea, or a combination of these factors. The vessel is in such poor condition as to be incapable of containing oil. However, metal samples of side plating and fittings were removed for analysis and video tape pictures were taken. All video tapes from the project are on file at Coast Guard Headquarters for record purposes.

C. Survey of R.P. RESOR.

On 16 August the R.P. RESOR was located at $39^{\circ} 46.2' N., 73^{\circ} 25.2' W.,$ some 19 miles east of the GULFTRADE, the position previously determined through the preliminary search of the CGC TAMAROA. This position was actually found to be one-half mile south of its charted position.

A four point moor was set using two ship's anchors forward, a second class nun and a second class special nun astern. Four investigation dives and three swimmer surveys were conducted. The hull, lying in 127 feet of water, was discovered in two sections, badly torn apart and covered with sea growth. A section of plating and rail were recovered for analysis but no indication of oil was found.

Since the first two target vessels were found and their investigations completed in three days and neither had a cargo hold intact, it was decided to continue the investigation off the New Jersey coast in search of a vessel sufficiently intact to retain its cargo. The Norwegian tanker VARANGER was next chosen as the third subject of investigation, with the British tanker COIMBRA as an alternate in the event the former could not be located or was found not to contain oil.

D. Survey of VARANGER.

The VARANGER was located on 21 August at 38° 59.2' N., 74° 04.4' W., 1.5 miles S.E. of its charted position. It was found to be in a better condition than the prior targets but with its tank sections open to the sea in 108 feet of water. The ship's safe was recovered and found to be flooded and empty except for an assortment of American and foreign coins and assorted 38 caliber shells. No indication of oil was found.

E. Survey of COIMBRA.

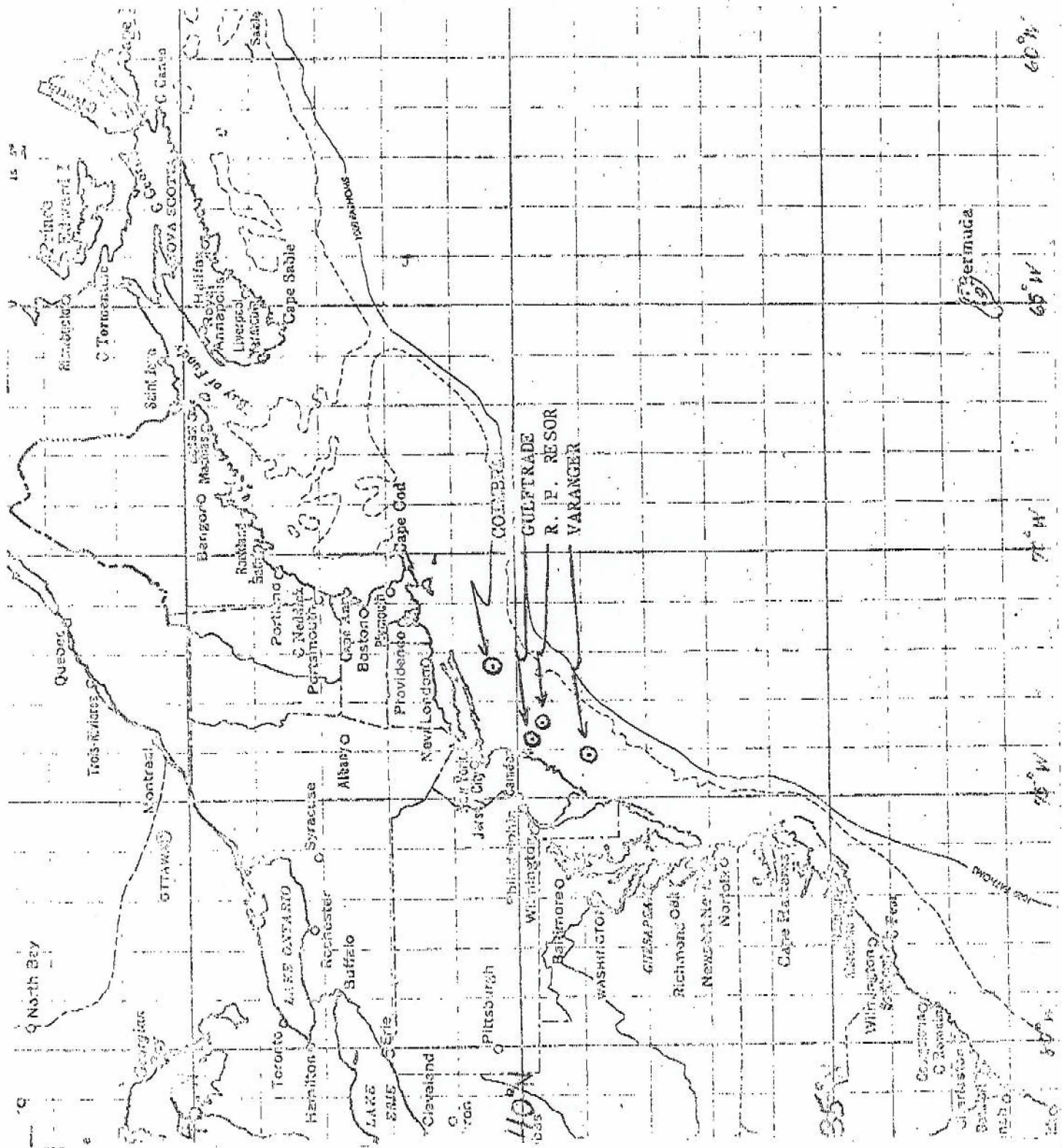
Difficulties in locating the British tanker COIMBRA resulted in a three day search which ended on 30 August. After a four point moor had been set by the SWEETGUM, divers established that the COIMBRA was split into three sections at position 40° 23.2' N., 72° 21.5' W., 30 miles S.E.

of the eastern tip of Fire Island, New York and 1.5 miles N.W. of its charted position. The center section is lying on its port side in 182 feet of water and inclines 75° degrees to port with only its starboard side above the mud line. The tanks are intact, two of which, located in the aft section, were closed to the sea. Divers attempted to penetrate the hull with their stud guns, but the excellent condition of the hull plate prevented its being more than dented with the force of the explosive. The explosive charge of the gun pushed the diver away rather than forcing the projectile through the plating which was measured at 0.9" inch on the hull. Divers then entered the starboard tanks through hatches and found only a trace of residual oil. They took samples which also contained slight traces of oil. The port and center tanks were below the mud line and inaccessible. Intermittent oil seepage was observed on the surface of the water but its source could not be located.

On 5 September 1967 investigation of the COIMBRA was completed and with it the operational phase of the Coast Guard's Sunken Tanker Project was concluded. Twenty-three days of operations off the coasts of New Jersey and New York included 41 dives by Ocean Systems, Inc., personnel totaling 22 hours and 14 minutes underwater.

V. Conclusions.

Evidence gathered from this project indicates that tankers sunk during World War II do not present a potential pollution threat to the American coastline. Information received from fishermen and divers from various areas along the coast, including North Carolina and Florida,



suggests that the condition of most known sunken vessels is comparable to conditions of those investigated by the Coast Guard. Therefore the Coast Guard has concluded that a continuation of the project at this time in other areas would not produce a substantially different determination.

The number of ships investigated and metal samples taken were too few to permit a statistical approach in developing meaningful conclusions with regard to corrosion. Further, due to the number of variables affecting the corrosion process and the difficulty in ascertaining the condition of tank structure at the time of sinking, it is unlikely that accurate forecasts as to how long a tank might contain its cargo can be made on the basis of standard corrosion technology. There is indication that a cargo will probably be lost from tanks thru ventilation or other fittings before plating and other structure corrodes away.