Chapter

8

Ship Explosions: Black Tom Island, SS *Mary Luckenbach,* SS *Robert Rowan,* USS *Mount Hood*

Black Tom Island, New Jersey, 30 July 1916.

The Black Tom Island, Jersey City, New Jersey, munitions explosions the early morning of Sunday 30 July 1916 in the New York City harbor involved an undetermined quantity of military munitions and other wartime explosives that had been accumulated well beyond legal limits at and in the vicinity of the ship loading pier at Black Tom Island. The munitions and explosives were waiting shipment to Britain and Russia for use against Germany in the First World War, which the United States had not yet entered. The initial explosion of perhaps 1,000 tons of TNT followed an initial shipboard fire and was followed for several hours by sympathetic explosions of nearby munitions stockpiles and the stores of munitions loaded in close-by railroad cars and barges.

The barge *Johnson 17,* moored to the pier at Black Tom Island, was loaded with 50 tons of TNT and 417 cases of detonating fuses. At 2:45 A.M. flame suddenly shot up from one of the munitions-loaded railroad cars on the pier. Simultaneously, another blaze flamed aboard *Johnson 17*. At 3:08 A.M. the earth shook, the sky lit up and Black Tom roared; *Johnson 17,* other munitions-laden barges near the pier and dozens of munitions-laden railroad cars exploded, essentially in one massive detonation. There was a pause of seconds, then a second mighty thunderclap. Over Jersey City the sky was brilliantly lit in a saffron hue. Red-hot shrapnel bombarded the brick walls of warehouses,

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plowed deep into the planking of the pier and splattered down on the waters of New York Harbor as a sizzling-hot rain.

In Manhattan, Staten Island and Brooklyn, and along a 15-mile stretch of the Jersey shore, men, women and children were thrown from their beds. In thousands of homes, windows facing the explosion were blown-in and windows on opposite walls were blown-out. Terrified by "a rumbling of thunder" and "a deafening roar" thousands of people in the greater New York area rushed in bare feet over broken window glass into the streets, clad in pajamas or nightgowns. In all of lower Manhattan few windows remained intact in any building, including the city's first skyscrapers. Patrons stepping out of night clubs in Manhattan were brusquely hurled back against the doors by a hot, powerful blast across the water from Jersey City. The arrivals of the earth shock and following blast wave 90 miles away in Philadelphia were sufficiently forceful to awaken most of that city's residents.

On Ellis Island, less than a mile from the explosion, the Ellis Island Immigrant Processing Center was battered by the blast wave and deluge of shrapnel. Total destruction of the Immigration station and hundreds of deaths and injuries were prevented when two blazing munitions barges that had drifted against the Ellis Island seawall were pulled away by railroad company tugboats and towed into Upper New York Bay where they exploded and sank. Newly-arrived immigrants were led out of their dormitories into a downpour of hot coal cinders. Explosions, with decreasing frequency, continued until dawn. Black Tom was gone, without a trace of the pier, the warehouses, the railroad cars, or the locomotives on and around the pier. Although only four persons were killed by the explosion, destruction and damage were finally calculated at $40 million.

The cause of the initial fire aboard the barge *Johnson 17* and the cause of the fire in the first railcar that ignited were finally established to have been acts of sabotage committed by German agents who had unchallenged access to the unguarded pier. The site of the Black Tom Island explosion is now included in New Jersey's Liberty State Park, a picnic and recreation area along the Hudson river and adjacent to the old Jersey Central Railroad terminal. A detailed account of the explosion

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and the long investigation that finally determined that sabotage had been the cause of the disaster is found in Jules Witcover's book, *Sabotage at Black Tom: Imperial Germany's Secret War in America, 1914-1917;* Chapel Hill, NC: Algonquin Books, 1989. "The Black Tom Explosion," an article by H.R. Balkhage and A.A. Hahling in *American Legion Magazine,* August 1964, provides a useful summary account.

Significantly, in 1916 U.S. history Margaret Sanger (1883–1966) was arrested for conducting a birth-control clinic in Brooklyn, NY. The previous year she had been indicted for sending birth-control information through the mails. She organized the first American (1921) and international (1925) birth-control conferences and in 1923 formed the National Committee on Federal Legislation for Birth Control. The same year Jeannette Rankin (1880–1973), a Republican, was elected the first woman in the United States to serve in Congress, 1917–1919; she was also elected a member of the 77th Congress, 1941–43. Rankin voted against the declaration of war on Germany in 1917 and in 1941 cast the only vote in the U.S. House of Representatives against entering World War II. A member of various antiwar organizations, in 1968 she led the Jeannette Rankin Brigade, a peace group, to Washington, DC, to protest the U.S. war in Vietnam.

SS Mary Luckenbach, 13 September 1942.

SS *Mary Luckenbach,* without WW II armament.

SS *Mary Luckenbach* was a World War I vintage cargo ship, one of more than 100 of the Hog Islander Class freighters built, 1918-1920, by the American International Shipbuilding Company at Hog Island near Philadelphia, Pennsylvania. She was propelled by a single screw and, in calm seas, capable of a then speedy 11.5 knots; the Hog Islanders were the world's first large fleet of ships that burned oil rather than coal. SS *Mary Luckenbach,* a typical Hog Islander, was a 7,600 ton cargo ship, 389 feet in length and 54 feet at

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the beam. The Hog Islander profile showed a raised forecastle and poop deck, and a midship island. A very interesting article of investigative historical research, "The Saga of Hog Island, 1917-1921: The Story of the First Great War Boondoggle," by James J. Martin, is available at:

http://www.blancmange.net/tmh/articles/hogisle.shtml

In early September 1942, SS *Mary Luckenbach* was one of 39 merchant ships, one or two rescue ships and several oilers that, with a large naval escort, composed Arctic Convoy PQ18 on the treacherous Murmansk Run from Scotland and Iceland to the northern Russian ports of Murmansk on the Barents Sea and Archangel further east and considerably south on the White Sea. The route turned the northernmost point of Norway at North Cape and thence southeast along the Kola Peninsula to Murmansk and then southeast and south to Archangel. The port of Murmansk is above the Arctic Circle but below the southern limit of sea ice, and is kept ice free in winter by the Norwegian Current, an extension of the relatively warm North Atlantic Current. Ships of the Murmansk Run convoys that survived attacks by German submarines positioned along the route and waves of German bombers that flew to meet the convoys from bases at Bodo and Banak, Norway, transported supplies critical to the Russian armies resisting the German invasion. The Soviet Union was attacked by Germany 22 June 1941. On 8 September 1941 the Germans had fully encircled Leningrad (Saint Petersburg) and began a siege that lasted 900 days, until 27 January 1944. During January and February 1942, 200,000 residents of Leningrad died of cold and starvation. At least 640,000 people died in Leningrad during the siege and some estimates put the number at 800,000.

Except the arctic runs to Murmansk and Archangel only the deepwater ports on the Persian Gulf were available to supply the Russian interior, but the long rail lines and roads from the Gulf to the Russian front, and their limited capacity, could not carry the vast quantities of munitions and food required by the Russian armies to defeat and force the retreat of the German invasion. During World War II, 40 convoys with a total of more than 800 ships, including 350 under the U.S. flag, started the

Murmansk Run. One of every eight was sunk by German bombs, torpedoes, mines, or the weather. The ships that got through to Murmansk and Archangel delivered 10-20,000 aircraft, 5,000 tanks, 375,000 trucks, 8,700 tractors, 51,500 jeeps, 1,900 locomotives, 15,000,000 pairs of boots, rifles, machine guns, auto tires, radio sets, and all the other equipment the West could provide needed by the Russian armies fighting on the Eastern Front. Most ships on the Murmansk Run carried some quantity of munitions and explosives among their cargoes. SS *Mary Luckenbach* carried 1,000 tons of TNT.

Location of Bear Island, Murmansk, Archangel

There are several narrative and historical accounts that describe the composition and passage of PQ18, but no two agree in the most significant details. Different accounts report the *Mary Luckenbach* exploded on 12, 13, 14 or 15 September 1942. The U.S. Coast Guard gives the date as 13 September, which is used here. My description of PQ18 is a composite account derived from the several available sources and provides a representative picture of the convoy and its passage. The most comprehensive account of PQ18 is Peter Smith's *Arctic Victory: The Story of Convoy PQ18;* London: Crecy, 1975 and 1994.

PQ18 had assembled in Loch Ewe, northwest Scotland, and sailed 2 September 1942 for Iceland where the convoy's naval escort was increased. The convoy was protected by the largest naval escort of any of the wartime convoys on the Murmansk Run. Close cover was given by the British escort aircraft carrier HMS *Avenger*, the anti-aircraft cruiser HMS *Scylla* and sixteen fleet destroyers; farther out three British heavy cruisers and their destroyer escorts shadowed the convoy. More distant cover was provided by the battleships HMS *Anson* and HMS *Duke of York*, together with a light cruiser and destroyers to the

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northeast of Iceland. British Home Fleet submarines patrolled off the Norwegian Lofoten Islands and northern Norway.

On 13 September the Liberty ship SS Oliver Ellsworth was torpedoed by the German submarine *U-589* and sunk. The U.S. Coast Guard compilation "U.S. Merchant Ship Losses During the Second World War" reports the *Oliver Ellsworth* went down in the World War II "Graveyard of the Arctic" at 75.52° N, 7.55° E, near Bear Island that is half-way between north Norway and the south cape of Spitsbergen (Svalbard). Later that day more than 40 German aircraft attacked the convoy. Junkers-88 torpedo-bombers dropped some 70 torpedoes at about 1,000 yards range against the long lines of slow freighters. Eight ships were sunk, including the *Mary Luckenbach* which was hit by an aerial torpedo. The U.S. Coast Guard gives her final location as 76° N and 10° E, which shows PQ18 had progressed somewhat to the north and east after the *Oliver Ellsworth* was sunk. According to the log of the Liberty ship SS *Esek Hopkins* the torpedo that destroyed the *Mary Luckenbach* was dropped by a burning plane and the explosion of the *Mary Luckenbach* is said to have destroyed that plane and another as well. Therefore, the ship exploded within several seconds of the torpedo hit.

SS *Mary Luckenbach* disintegrated when her cargo of 1,000 tons of TNT detonated in one massive explosion. The number of her merchant crew and Navy Armed Guard complement are given inconsistently by different sources, 38-46 for her merchant crew and 16-27 for her Navy Armed Guard complement; all perished. Robert Hughes, Royal Navy Volunteer Reserve (RNVR) Gunnery Control Officer on HMS *Scylla* provides a description of the explosion in his book, *Flagship to Murmansk (Through the Waters*); London: William Kimber & Co., Ltd., 1956: "A stupendous column of smoke was rocketing to heaven, and as we looked an immense glow lit the column, and great cerise, orange-and-yellow fragments arched outwards towards us . . . [later] the great smoke column was still thousands of feet high and mushrooming out

SS *Mary Luckenbach* explosion.
Turbulent cloud of flame,
at estimated 5-10 seconds.

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where it met the clouds. At its base flames still flickered and the following ship was altering course to avoid them."

SS *Mary Luckenbach* explosion. Stem of the mushroom cloud, at estimated 15-20 seconds

Nothing was left of the ship except a pillar of smoke when rescue craft arrived to look for survivors. Nearby, the blast shook SS *Schoharie*, also a Hog Islander, as though she had been torpedoed, throwing men flat on the deck while fragments of hot steel from the exploded ship crashed down upon her from bow to stern. On the Liberty ship SS *Nathaniel Greene*, Captain George Vickers had just swung his ship away from one of several aerial torpedoes when the *Mary Luckenbach* blew up. He thought at first that his ship had been hit and ordered the crew to lifeboat stations. The blast threw gunners from their stations, smashed the galley, broke doors, and also showered the vessel with debris, including shell casings from the *Mary Luckenbach*'s guns. Captain Richard Hocken of the Liberty ship SS *William Moultrie*, steaming in the same column immediately astern of the *Mary Luckenbach*, said that when his ship passed over the spot, "there was nothing left of her at all—not even a raft—no wreckage, not even a match box; hardly a ripple on the surface of the sea."

The three photos that show the explosion of the *Mary Luckenbach* vividly document the progression of the explosion as viewed from three different ships in the convoy. The first photo was taken, I estimate, 5-10 seconds after the moment of detonation and shows the initial cloud of turbulent flaming gasses generated by the explosion. Taken within a few seconds of the explosion, this remarkable photograph required a man capable of very quick mental and physical responses, and who had a camera at hand. Since the convoy was under German air attack at that moment I am inclined to credit the photograph to an unknown Navy Armed Guard anti-aircraft gunner whose mental and physical responses as a gunner enabled him to quickly target and shoot this photo.

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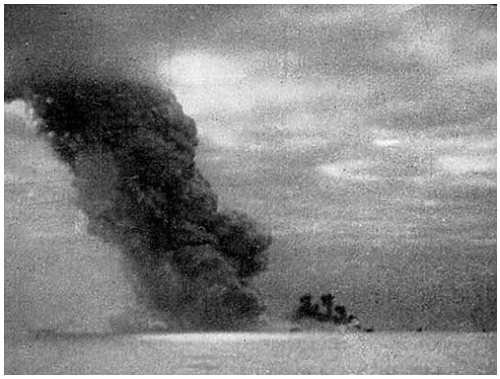

SS *Mary Luckenbach* explosion. Smoke column, at estimated 2-3 minutes

The second photo, which I estimate was taken some 15-20 seconds following the detonation, shows the stem of the cloud of smoke that has formed a mushroom cloud. The third photo in the sequence shows the column of smoke that has pierced through the cloud ceiling 2-3 minutes after the explosion; the base of the cloud cover is probably 2,500 feet above the water.

Convoy PQ18, after fighting nearly all the way, arrived at its destination, Archangel, 21 September. Planes and U-boats had sunk thirteen of the convoy's ships at a cost of six German U-boats and 41 aircraft during one week of fighting. In recognition of gallantry during the passage of PQ18 the U.S. Maritime Administration awarded the officers and seamen of the *Nathaniel Greene* and the *William Moultrie* the Gallant Ship Citation Ribbon, and both ships were awarded the Gallant Ship Plaque. The texts of the citations read:

SS Nathaniel Greene

"During a long voyage to North Russia, SS *Nathaniel Greene* was under incessant and violent attack by enemy planes and submarines. In most gallant fashion, and in spite of many crew casualties, she consistently out-maneuvered and out-fought the enemy, finally discharging her vital cargo at the designated port. After effecting temporary repairs to her battered hull and rigging, she took part in the North African Campaign. Bound for her last port, with limited cargo, she was torpedoed, and in a sinking condition was successfully beached.

"The stark courage of her heroic crew in battle against overpowering odds caused her name to be perpetuated as a Gallant Ship."

SS William Moultrie

"Emerging victoriously from an extremely battered convoy, numbering many sunken ships, SS *William Moultrie* arrived at the scheduled North Russian port and discharged her vitally needed cargo. Expert

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maneuvering and coordinated gun control during the highly concentrated submarine and bombing attacks over a period of one week prevented crew casualties and brought the series of actions to a successful conclusion. "The stark courage of her heroic crew in defeating a relentless enemy caused her name to be perpetuated as a Gallant Ship."

For conduct during the passage of PQ18 Captain Richard Hocken of SS *William Moultrie* was awarded the Merchant Marine Distinguished Service Medal, with the citation:

"His ship, the SS *William Moultrie,* in a convoy which suffered heavy losses, fought through a week of continuous attacks by enemy bombers and submarines to deliver her cargo of war material to a north Russian port. In the course of the long, running battle, the ship was directly attacked 13 times and was credited with downing eight planes and with scoring hits on 12 others. During the first attack on the convoy, the *William Moultrie* distinguished herself by shooting down three torpedo planes and assisting in the destruction of six more. The following day her guns shot down four more of the attacking planes and damaged five. Later, after successfully repelling another attack by planes, four torpedoes were sighted heading for the ship. The guns fired on them, exploding one and the other three were eluded by skillful seamanship. Captain Hocken, master of a gallant ship and a gallant crew, exhibited qualities of leadership and high courage in keeping with the finest traditions of the U.S. Merchant Marine."

SS Robert Rowan, 11 July 1943.

During Operation Husky the Allies launched an invasion of Sicily from North African bases, 9-11 July 1943. General George S. Patton landed two and a half divisions of the U.S. 7th Army at Licata and Gela, on the island's south coast, and Field Marshal Bernard Law Montgomery ("Monty") landed four and a half divisions of the British 8th Army at several places on the southeast coast, near Syracuse. The Sicilian invasion was accomplished without significant opposition on the beaches but inland, before the island was captured after a campaign of 39 days, ten divisions of General Mussolini's Fascist Italian army, supported by two German divisions, took a toll of 31,158 Allied forces

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killed, wounded or missing. Estimated German casualties were 37,000; 7,000 were captured, but 60,000 German troops were evacuated across the Strait of Messina to Italy. Casualties among Italian troops are estimated to have been 130,000.

Benito Mussolini was Italy's Fascist dictator from 1922 to 1943. On 29 September 1943 Marshal Pietro Badoglio, who represented the Italian Government because Mussolini had fled from Rome, surrendered to U.S. General Dwight David Eisenhower, Commander-in-Chief, Allied Forces, North Africa. On 28 April 1945, just before the Allied armies reached Milan, Mussolini and his mistress Clara Petacci were captured by Italian partisans near Lake Como as he tried to take refuge in Switzerland. He was summarily executed and his body was later strung up by its heels on the Piazzale Loreto in Milan. The same day, 28 April, south of Milan, the Brazilian Expeditionary Force surrounded the German 148th Grenadier and Italia Bersaglieri Divisions. The German commander surrendered the following day and during the next twenty-four hours the Brazilians collected more than 13,500 German prisoners. Often neglected in summary discussions of the Allied forces that contributed significantly to the capture of Italy's valley of the river Po and Milan were the Japanese-American 442d Regiment, the 1st Brazilian Infantry Division, the free Italian Legnano Combat Group (U.S. II Corps and Fifth Army, and the 6th South African Armored Division.

Helping to lift the great American and British armies and their supplies to the Sicilian invasion beaches were scores of Liberty ships that had assembled in North African ports over a period of many weeks. Most of the Liberty ships had temporary accommodations for some 200 troops in addition to the civilian merchant marine crew and Navy Armed Guard complement. On 11 July at 1:50 P.M. a fleet of perhaps 35 Junkers Ju-88 vertical bombers were overhead targeting their bomb loads on the ships assembled in the harbor at Gela.

The munitions-laden Liberty ship SS *Robert Rowan*, carrying her crew and troops of the U.S. 18th Infantry, took a bomb in her forward hold which started an uncontrollable fire; the ship was expected to explode immediately. All other ships in her immediate area began moving out

of range. SS *Robert Rowan*'s captain ordered her abandoned. Before the *Robert Rowan* exploded 20 minutes later at 2:15 P.M. all 421 men aboard her when the bomb hit were taken off by PT boats (patrol torpedo boat) and transported to the destroyer USS *McLanahan* (DD-615). After the men from the *Robert Rowan* were taken aboard *McLanahan*, in the words of George E. Smith, USN, of *McLanahan*'s Engineering Department, "we shagged out of there." The noise of the explosion, he said, "was indescribable," and the explosion "strung parts of that ship all over the area."

Placing an ammunition ship at risk of concentrated German bomber attack in the transport attack area of the harbor at Gela signified that the *Robert Rowan*'s mission was to provide re-supply ammunition to the troops that had landed. Ships at anchor or maneuvering in the attack transport area would not have carried naval warship ammunition or bombs; therefore the *Robert Rowan*'s ammunition cargo certainly did not include the tons of concentrated TNT explosives of naval depth charges and aerial bombs and consisted principally of artillery, mortar and gun ammunition. Ammunition of those types generally will not explode "high order" in a fire and most of it will burn furiously, deflagrate, or detonate "low order." SS *Robert Rowan* burned furiously for 20 minutes before she exploded.

SS *Robert Rowan* explosion

Although the explosion of the *Robert Rowan* was a mammoth detonation and possibly equivalent to a high order explosion of 500 tons of TNT, the ship did not entirely disintegrate; she was broken in half and only partially submerged when she sank to the shallow harbor bottom. Her intact portions continued to burn with intermittent small explosions through the afternoon and night. Above the initial fire, and following the first large explosion, a huge pillar of black and white smoke rose to an estimated 4,500 feet; at the lower levels,

up to perhaps 2,000 feet, the cloud was fitfully punctuated by the aerial explosions of artillery shells and tracer ammunition thrown up from the devastated hulk as the remainder of her munitions cargo burned and detonated in relatively small bursts. At 6:00 A.M., 13 July, the above-water remains of SS *Robert Rowan* were still smoking.

USS Mount Hood, 10 November 1944.

The ammunition ship USS *Mount Hood* (AE-11) was built by the North Carolina Shipbuilding Company, Wilmington, North Carolina; launched 28 November 1943; acquired by the Navy on loan-charter basis, 28 January 1944; converted by the Norfolk Shipbuilding & Dry Dock Co., Norfolk, Va., and the Navy Yard, Norfolk, Va.; and commissioned 1 July 1944. She was 459 feet of length, 63 feet at the beam, and displaced 13,910 tons. At 8:50 the morning of 10 November 1944 USS *Mount Hood* was at anchor at berth 380 in Seeadler Harbor, Manus Island Naval Base, Admiralty Islands northwest of New Guinea. She was acting as a floating ammunition depot, simultaneously receiving munitions by lighters from, and delivering munitions to, other ships in the harbor. It was fortunate that the explosion did not occur one month earlier when Seeadler Harbor was packed with at least 600 ships and possibly as many as 1,000, including those of the U.S. Seventh Fleet commanded by Vice Admiral Thomas Cassin Kinkaid.

USS *Mount Hood*

Admiral Kinkaid was at that time himself under the direct command of Army General Douglas MacArthur, and the Seventh Fleet was then known as "MacArthur's Navy." The Seventh fleet was staging for General MacArthur's invasion of Leyte Island in the Philippines and the Battle for Leyte Gulf, 23-26 October 1944; the Battle for Leyte Gulf is generally considered by naval historians to have been the greatest naval battle ever fought. At the time the *Mount Hood* exploded there were no major combatant ships in the harbor at Manus, but there

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were 272 cargo vessels, troop transports, oilers, and other noncombatant auxiliary vessels at anchor; 37 large ships and 56 smaller craft in the harbor within a 2,400-foot (approximately one-half mile) radius of the *Mount Hood* were severely damaged, mainly by the initial barrage of steel fragments from the disintegrated ship. The radius of Class B damage from the explosion of the *Mount Hood* was essentially the same as for the Port Chicago explosion.

Aboard USS *Mount Hood* the ship's crew and other Navy personnel were working all the ship's five cargo holds when she exploded in one massive detonation that entirely disintegrated and fragmented the ship; personnel casualties on the *Mount Hood* and on other vessels totaled 45 known dead, 327 missing and 371 injured. Witnesses saw a small explosion, about the size of a single bomb, that was followed a few seconds later by the main explosion. The Navy Board of Investigation convened to inquire into the explosion determined, "There were approximately 3,800 tons of ammunition aboard. This included bombs, projectiles, fixed ammunition, rockets, both bodies and motors, smokeless powder, aerial depth bombs, and nose fuses. Torpex loaded depth bombs were apparently coming on board."

Of the approximately 3,800 tons of ammunition cargo weight aboard the *Mount Hood*, the projectiles and fixed ammunition, rocket bodies and motors, smokeless powder and nose fuses among that cargo, whatever their amount, would not have detonated high order but would have burned in the explosion or detonated low order. The *Mount Hood* Board of Investigation findings did not determine nor estimate the portion of the 3,800 tons of munitions cargo weight aboard the exploded ship that would be expected to burn or detonate low order, but we will make the estimate that 33 per cent of the 3,800 tons of munitions cargo weight aboard the *Mount Hood* were munitions that would be expected to burn or detonate low order. Thirty-three per cent of the munitions cargo weight aboard the *E.A. Bryan* were determined to be munitions that would burn or detonate low order in the explosion of that ship.

A 33 per cent reduction of the 3,800 tons munitions cargo weight aboard the *Mount Hood* provides a probable total high explosive

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munitions cargo weight aboard *Mount Hood* of 2,546 tons. This estimate will permit ready comparison of the high explosive munitions cargo weight aboard the *Mount Hood* with the high explosive munitions cargo weight aboard the ship *E.A. Bryan* that exploded at Port Chicago.

Records in the Archives of Los Alamos National Laboratory that describe in detail the circumstances of the 17 July 1944 explosion of SS *E.A. Bryan* at the Port Chicago Naval Magazine pier show that 4,373 tons of munitions cargo weight were aboard the *E.A. Bryan* at the time of the explosion. But of those 4,373 tons of munitions cargo weight, Los Alamos determined that 1,434 tons (approximately 33 per cent) were 5-inch and 3-inch anti-aircraft projectiles and 40 mm. cartridges that would have burned or detonated low order in the explosion of the *E.A. Bryan*. The total high explosive munitions cargo weight aboard SS *E.A. Bryan* was thus 2,930 tons, which compares with the 2,546 tons high explosive munitions cargo weight aboard USS *Mount Hood.*

The high explosive munitions cargo weight aboard the *E.A. Bryan* thus exceeded, by 384 tons, the high explosive munitions cargo weight aboard the *Mount Hood.* However, if the TNT charge weight of those 384 tons of high explosive munitions is considered that difference is seen to be insignificant in the context of the two ship explosions.

The cargo weight of the high explosive munitions aboard the two ships can be analyzed to ascertain the TNT charge weight of those high explosive munitions. Los Alamos determined that the TNT charge weight of the 2,930 tons high explosive munitions aboard the *E.A. Bryan* was equal to 1,577 tons of TNT, which is essentially 53.59 per cent of the cargo weight of the high explosive munitions aboard the *E.A. Bryan.*

The 2,546 tons cargo weight of high explosive munitions aboard the *Mount Hood* was, therefore, equal to 1,364 tons of TNT (2,546 x 53.59 per cent = 1,364). The TNT charge weight aboard the *E.A. Bryan* was 1,577 tons. The explosion of the *Mount Hood* thus involved 213 tons of TNT less than the explosion of the *E.A. Bryan* (1,577 - 1,364 = 213).

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In the context of the two ship explosions the difference of 213 tons of TNT is insignificant.

For comparative purposes the Port Chicago explosion of SS *E.A. Bryan* and the explosion of USS *Mount Hood* involved essentially the same TNT charge weight of World War II high explosive munitions of the types employed by the U.S. in the Pacific Theater of war. The explosions of the *E.A. Bryan* and the *Mount Hood* should be indistinguishable in all their physical manifestations, but the two explosions are readily distinguishable by the considerable difference of height to which the column flame and smoke cloud rose above each of the two explosions..

Previously classified Manhattan Project documents in the Archives of Los Alamos National Laboratory document that, at Port Chicago, a column of flame rose 7,000-10,000 feet above the explosion; no measure of the height to which the smoke cloud ascended above the Port Chicago explosion is provided by those documents, presumably because the dark smoke cloud was invisible against the black, moonless night sky. But, as we have learned from review of the several explosions detailed in this and the previous chapter, the height to which the smoke cloud rose above the Port Chicago explosion was necessarily many thousands of feet higher than the 7,000 to 10,000-foot height to which the column of flame rose above Port Chicago.

The column of flame rising from the Port Chicago explosion was, however, easily discernable against the dark night sky at 10:30 the evening of 17 July 1944. The rising column of flame was precisely observed by the pilots and one copilot of two Army Air Corps airplanes flying line-of-sight toward Port Chicago when the explosion occurred. First Lieutenant Sidney P. Phillips of the Reno Army Air Base, pilot of a C-49 cargo plane, was 5-8 miles from the explosion at altitude 9,000 feet; his copilot was Second Lieutenant Fred Dregor, Jr. Second Lieutenant R.A. Smith, also of the Reno Army Air Base (type of plane unreported), was 3.5 miles from the explosion at 7,000 feet altitude.

The two pilots and copilot Dregor provided excellent descriptions of the towering Port Chicago column of flame in testimony to the Navy

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Court of Inquiry that investigated the explosion. Those testimonies are summarized in two of Capt. William Parsons' reports from Los Alamos that were addressed and transmitted to Adm. William Purnell of the Atomic Bomb Military Policy Committee. In his 4 August 1944 memorandum, "Port Chicago Disaster: Second Preliminary Report," Captain Parsons informed Adm. Purnell, "Two Army airplanes witnessed the explosion, the pilots agreeing that the flame rose to 8,000 feet." In his 31 August 1944 memorandum to Adm. Purnell, "Port Chicago Disaster: Third Preliminary Report," Capt. Parsons wrote, "The explosions resulted in a column of flame which expanded and billowed at the top as it rose, and reached an altitude of 7,000 to 10,000 feet."

The column of flame from the Port Chicago explosion, which expanded and billowed and reached an altitude of 7,000 to 10,000 feet, may be instructively compared with the column of flame that rose 10,000 feet above the 16 July 1945 nuclear explosion conducted at Trinity site in New Mexico. Major General Leslie R. Groves, military director of the Manhattan Project, was an observer at the Trinity explosion. In his 18 July 1945 memorandum to Secretary of War Henry Lewis Stimson the General reported the characteristics of the fireball, column of flame, and smoke cloud that formed above the Trinity explosion:

"For a brief period there was a lighting effect within a radius of 20 miles equal to several suns in midday; a huge ball of fire was formed which lasted for several seconds. This ball mushroomed and rose to a height of over ten thousand feet before it dimmed . . . A massive cloud was formed which surged and billowed upward with tremendous power, reaching the substratosphere at an elevation of 41,000 feet, 36,000 feet above the ground, in about five minutes, breaking without interruption through a temperature inversion at 17,000 feet which most of the scientists thought would stop it."

The expectation held by "most of the scientists" that the temperature inversion would stop the ascent of the rising smoke cloud from the Trinity test is first mentioned in the "History of 10,000 ton gadget," which mathematically modeled and predicted the effects of the Trinity test. Step 10 of the "History" predicted the Trinity ball of fire and

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succeeding smoke cloud would "mushroom out at 18,000 ft in typical Port Chicago fashion." The scientists expected the cooling top of the rising smoke cloud from the Trinity test would lack sufficient heat-driven buoyant force to pierce through the heavy, cold air at the base of the temperature inversion which is typically layered at 18,000 feet. The smoke cloud that rose above the 1,000 tons of TNT that exploded aboard SS *Mary Luckenbach* lacked sufficient heat-driven buoyant force to pierce through the cold, heavy cloud cover lying only 2,500 feet above that explosion. Robert Hughes, Gunnery Control Officer on HMS *Scylla* reported the smoke cloud above the explosion of SS *Mary Luckenbach* mushroomed out "where it met the clouds."

Although no measurement of the height of the smoke cloud above the Port Chicago explosion is found among presently available Los Alamos documents that describe the explosion, the rising smoke cloud from the Port Chicago explosion would have been imaged and tracked by radar installations operating, at the time of the explosion, at the Fairfield-Suisun Army Air Base, now Travis Air Force Base, 20 air miles north of the Port Chicago Naval Magazine. The Fairfield-Suisun AFB radar units were of two types: the microwave SCR-584 automatic tracking radar, a particularly fine precision radar used for aircraft positioning data and antiaircraft gun laying, and the microwave SCR-615B fixed radar unit. Both systems, with a range of 40 miles, worked very well for cloud imaging and storm tracking. For many years the National Oceanic and Atmospheric Administration (NOAA) used an unmodified SCR-584 as a weather radar.

General Groves' 18 July 1945 report to Secretary Stimson includes, as quoted text, a report from the General's liaison officer positioned at the Alamogordo Army Air Base, 60 miles from Trinity site. That unnamed officer reported:

"The original flash lasted approximately 10 to 15 seconds. As the first flash died down, there arose in the approximate center of where the original flash had occurred an enormous ball of what appeared to be fire and closely resembled a rising sun that was three-fourths above a mountain. The ball of fire lasted approximately 15 seconds, then died down and the sky resumed an almost normal appearance."

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Although the energy yield of the Trinity explosion was one order of magnitude greater than the energy yield of the Port Chicago explosion, the characteristic temperature of the nuclear fireball and succeeding column of flame produced by the Trinity explosion was the same as the temperature of the fireball and succeeding column of flame produced by the Port Chicago explosion. The ball of fire and column of flame produced by the Port Chicago explosion were typical of a nuclear explosion, and were accurately used by Joseph O. Hirschfelder and William G. Penney to predict the characteristic behavior of the fireball and column of flame that did result from the Trinity nuclear weapon test. General Groves' report on the Trinity site test is available at:

http://www.nuclearfiles.org/menu/library/correspondence/groves-leslie/corr_groves_1945-07-30.htm

In Capt. Parsons' "Port Chicago Disaster: Third Preliminary Report," Appendix I of Enclosure D, "Report of Ensign G.T. Reynolds, USNR," we find a summary of the Court of Inquiry testimony of pilots Phillips and Smith, and Phillips' copilot, Dregor. Lieutenant Smith flying at 7,000 feet altitude testified, in part, that he had witnessed "one pyrotechnic display or one mass of billowing flame extending to at least 1,000 feet above the plane . . . The flame was first observed as 2,000 to 3,000 feet high and it continued to build up for about 15 seconds to a height of at least 8,000 feet."

USS *Mount Hood* explosion

Lieutenants Phillips and Dregor flying at 9,000 feet reported, in part, "There was a terrific white flash with a smoke ring about 3 miles in diameter. Then in the center a terrific flash 'whooshed' up to at least 9,500 feet." Ensign Reynolds reported in this document that the observations of Lt. Smith were "apparently good information," but "not as good" as the observations of Lieutenants Phillips and Dregor, which are only summarized here but

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will be provided in their entirety in a later chapter.

For the explosion of the *Mount Hood*, the Navy Board of Investigation had determined by 9 December 1944, from observations made by competent eyewitnesses, that above the daytime explosion of the *Mount Hood* the "flame and smoke" had risen to a height of 7,000 feet. It must be understood that the maximum height achieved by the smoke cloud was 7,000 feet and that the flame from the explosion of the *Mount Hood* would necessarily have risen to a much lesser height; probably, in my estimation, not more than 1,500 feet above the explosion. The USS *Mount Hood* Board of Investigation determined, "The flame and smoke from this explosion extended about 1,000 feet in radius and rose 7,000 feet."

Concerning the cause of the explosion of the *Mount Hood* the Board of Investigation ruled that the evidence indicated "the possibility of the detonation of TPX-loaded [torpex] depth bombs while it [sic] was being loaded into Number 3 or 4 hold. Detonation could have been caused by striking the hatch with the bombs on the way down or dropping them into the hold carelessly."

For additional information on the explosion of USS *Mount Hood* see: "Flash of Darkness" by Dale P. Harper, *World War II* magazine (publication date not available), and "The USS *Mount Hood* Explosion" at:

http://www.geocities.com/Athens/Acropolis/3535/mthood.html

For additional photos of the explosion of USS *Mount Hood:* U.S. Navy Historical Center.

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Photographs and illustrations credits.

SS *Mary Luckenbach*, without WW II armament. Source: Courtesy Peter Thompson, Department of Economics, Florida International University. Photo available at:
http://www.fiu.edu/~thompsop/liberty/hog_island.html

Map showing location of Bear Island, Murmansk, Archangel. Source: Mapquest.com

SS *Mary Luckenbach* explosion. Turbulent cloud of flame, at estimated 5-10 seconds. Source:
www.culture24.org.uk/places+to+go/south+west/bristol/art24845

See also the same or similar photo, p. 109; Bunker, John. *Heroes in Dungarees: The Story of the American Merchant Marine in World War II*. U.S. Naval Institute Press, 2006.

SS *Mary Luckenbach* explosion. Stem of the mushroom cloud, at estimated 15-20 seconds. Source: WWW site unrecoverable.

SS *Mary Luckenbach* explosion. Smoke column, at estimated 2-3 minutes. Source: Robert Hughes, *Flagship to Murmansk (Through the Waters)*. London: William Kimber & Co., Ltd., 1956.

SS *Robert Rowan* explosion. Source: U.S. Army Signal Corps Photo, MM-43-L-1-23 (Lieutenant Longini). Available at:
http://www.geocities.com/Pentagon/Base/1250/dd615smith.html

USS *Mount Hood.* Source: Bureau of Ships Collection, U.S. National Archives; photo No. 19-N-70330. Available at:
http://www.history.navy.mil/photos/sh-usn/usnsh-m/ae11.htm

USS *Mount Hood* explosion. Source: U.S. Naval Historical Center photograph from the War Diary, Manus Island Naval Base, for November 1944; photo No. NH 96173. Available at:
http://www.history.navy.mil/photos/sh-usn/usnsh-m/ae11-k.htm