ICEBREAKERS AND THE U.S. COAST GUARD

by Donald L. Canney

Among the many missions of the U.S. Coast Guard, icebreaking is generally viewed as a rather narrow specialty, associated most often in the public mind with expeditions into the vast Polar unknowns. However, a study into the service's history of ice operations reveals a broad spectrum of tasks - ranging from the support of pure science to the eminently practical job of life saving on frozen waters. Furthermore, the nature of each of these functions is such that none can be considered "optional": all are vital - whether it be in the arena of national defense, maritime safety, international trade, or the global economy.

The origin of icebreaking in the United States came in the 1830s, with the advent of steam propulsion. It was found that side-wheel steamers with reinforced bows were an excellent means of dealing with harbor ice, a problem common to East Coast ports as far south as the Chesapeake Bay. These seasonal tasks were common, but were strictly local efforts with no need to involve the Coast Guard (then called the Revenue Marine or Revenue Cutter Service). The service's first serious encounter with operations in ice came after the purchase of Alaska in 1867. The Revenue Cutter *Lincoln* became the first of many cutters to operate in Alaskan waters. Though the vessel was a conventional wooden steamer, she made three cruises in Alaskan waters before 1870. Since that time the Bering Sea patrol and other official - and unofficial - tasks made the Revenue Service a significant part of the development of that territory and state.

The true "icebreaker" was yet to come, however. The next vessels to work in Alaskan waters were *Corwin*, *Bear*, and *Thetis*. The first of these was also a conventional steamer, though built with slightly more substantial framing than her contemporaries. *Bear* and *Thetis*, however, were constructed for work in icy regions. *Bear*, which has been called the Coast Guard's equivalent of "Old Ironsides", was built in Dundee, Scotland in 1874 as a sealer and whaler. She was 198 feet in length and 1,700 tons, with auxiliary reciprocating steam engine and barkentine rig. Her suitability for ice operations was not based on ice breaking ability, but on extraordinarily strong wood construction. She was framed of English oak with substantial longitudinal teak reinforcement and had iron plating on her stem. Her hull could be subjected to considerable ice pressure, and, because of the inherent flexibility of wood, regain its shape when free.

Thetis was a similar auxiliary steamer, though barque-rigged. These two vessels were assigned to Alaskan and Bering Sea duties from the 1890s to the 1920s, along with other conventional cutters. Their duties varied, and, given the harsh climate, often dangerous. For many years the Revenue Service was the sole source of Federal authority in the territory, including seven years when the Treasury Department was given charge of the rugged landmass. Duties of these vessels and men included protection of sealers and whalers, providing general police protection, and emergency operations. One of the more unusual tasks was importing Siberian reindeer to provide a food staple for starving Eskimos.

In the era between the acquisition of the *Bear* and her retirement from the service in 1926, the first true icebreakers were developed. Though various ice-strengthened vessels were built in the era, most were simply ice resistant, and had neither the requisite horsepower nor hull design for forcing the vessels through the ice. However, in 1899 the Russian government accepted the British vessel *Ermak*, which is considered the first true icebreaker. She was 10,000 tons and 10,000 horsepower, with four screws: three aft and another forward. With 1 1/2 inch plating at the waterline, she became the prototype of icebreakers to come.

From the turn of the century to the commissioning of the *Northland*, the service's replacement for the venerable old *Bear*, several vessels were employed for ice work on the East Coast. Two, *Apache* (formerly named *Galveston*) and *Ossipee*, were vessels with hulls strengthened for this duty. The latter, a 165' steel cutter, was built with such reinforcement, and was assigned to the New England coast in 1915. Documentation indicates that the *Apache* underwent strengthening in one of her rebuilds, probably in 1905, and was assigned to the Chesapeake Bay area, where light ice breaking is sometimes necessary.

The case of the cutter *Androscoggin*, commissioned in 1908, is a special one. She was purposely built as a cutter "for the coast of Maine" and to "break through the ice along the Maine coast for the relief of shipping." She had machinery that developed 1,600 horsepower, a spoon bow and was strongly built of white oak, with steel reinforcement and frame. The are also indications that she was later given a metal casing for her prow. Little is known about this unusual ship's ability to break ice, but she was certainly the last major naval or Coast Guard ship to have a wooden hull.

Finally, in late 1926, while *Northland* was under construction, a purchased ocean tug, *Kickapoo*, was docked and rebuilt as an icebreaker. In order to use her in shallow harbors she was widened by eight feet, thereby reducing her draft, then an entirely new icebreaker bow, similar to that of the *Northland*, was built on her. Her duty station was the coast of Maine, to replace *Androscoggin*, which was sold in 1922.

By the 1920s the Coast Guard's commitment to ice operations, including icebreaking, was entrenched, and, indeed, imperative. This, despite the fact that authorization in the form of Congressional action would not be forthcoming until the mid 1930s. Along the Atlantic seaboard, ice operations had resulted simply from the service's commitment to safety at sea, a task which was impossible in winter months without preparations for the contingency of ice.

In the Pacific, the ice breaking task had come about with the nation's acquisition of Alaska, nearly a third of which lies above the Arctic Circle. With these imperatives in mind, as well as the retirement of *Thetis* in 1916 and *Bear* in 1927, it was obvious that the service needed to rebuild their ice breaking fleet. The rebuilding of *Kickapoo* had been a step in this direction, but had not met the requirement for a major vessel for Alaskan and Bering Sea duties. The cutter *Northland* was the upshot of these factors.

Though *Northland* has been called an icebreaker, her design was more influenced by the *Bear* than by European heavy icebreakers such as *Ermak*. Though she had the familiar cut away icebreaker bow and heavy plating to withstand ice pressures, her power plant lacked the preponderance of horsepower required for heavy icebreaking. She was 216 feet long, just over 2,000 tons and her twin diesel electric engines developed at maximum, 1,000 horsepower (the old *Androscoggin* had exceeded this output). Her hull, however, was welded steel, reinforced on her sides and she was thoroughly subdivided into watertight compartments. For the first years of her service life, she sported an anachronistic sailing rig, to satisfy those old Arctic hands who looked to sail propulsion to extract her from dangerous waters should her new internal combustion engines fail. She was commissioned in February, 1927 and took up station on the Pacific, operating from San Francisco, then Seattle, on the Bering Sea patrol. She made her last Alaska cruise in 1938. During World War II she was transferred to the Atlantic and the Greenland theatre of operations.

Following *Northland*, the Coast Guard's next vessels for ice operations were the six 165A class cutters: the *Escanaba*-class. These vessels were based on the hull design of *Tallapoosa* and *Ossipee* of 1915. Their bows were moderately cut away at the forefoot, the plating was doubled on their bows. They were intended for light icebreaking on the Great Lakes. In service, these vessels, *Escanaba* , *Tahoma*, *Mohawk*, *Comanche*, *Algonquin*, and *Onondaga*, proved only sufficient to 'chip away' at the ice in the early part of the season.

It was not until a year after the commissioning of the last of the *Escanaba*-class (*Mohawk* in 1935) that the Coast Guard received the first statutory authorization for icebreaking operations. It had become apparent that clear seaways and ports were vital for the passage of fuel oil barges in the winter months along the New England coast. This led to President Roosevelt's Executive Order No. 7521, issued December 21, 1936, directing the Coast Guard "to assist in

keeping open to navigation by means of icebreaking operations...channels and harbors within the reasonable demands of commerce."

After this directive, the Coast Guard initiated an intensive study of icebreaker technology with an eye towards building first line heavy vessels primarily for that purpose. In the years 1936 to 1941, Rear Admiral Edward Thiele spearheaded this research, in part by visiting various northern European nations and studying their vessels first hand. Of particular interest was *Ymer*, a Swedish vessel considered the best icebreaker of the time. Ironically, he learned that vital elements of her design had been copied from American sources. Her two propeller aft, one forward feature had been used in automobile ferry boats on the Great Lakes, and her diesel electric power plant was the same type of installation which had seen considerable success in the icebreaker Northland. Also of special interest were the ice plows used in Scandinavian and North Sea ports. These were simply separate ice crusher prows that were attached to standard tugs and filled with water to give sufficient weight for breaking through the ice and throwing it aside. The immediate upshot of Theile's travels and study was the design of the 110-foot *Raritan*-class tugs. The main features of these were structural strength and a bow shape which would overcome the shortcoming of the cutaway configuration utilized in such vessels as the *Northland*: the lack of directional stability. In this design the "keel" projects forward and fairs into the slope of the stem providing a stabilizing element beneath the sharp upward angle of the icebreaking bow. These vessels were the first class of true icebreakers in the service, and proved eminently successful. They were the *Arundel, Naugatuck, Mahoning*, and *Raritan*, commissioned from April to August, 1939.

As war became imminent, there was increased urgency in the study of icebreakers. In 1941, shortly after Hitler invaded Russia, arrangements were made for the Soviet icebreaker *Krassin* to be transferred temporarily to the U.S. The planned eight month loan was cut short at less than four, but long enough for the Coast Guard to study her thoroughly. She was about 10,000 tons and 10,000 horsepower, with reciprocating steam engines driving three screws (presumably one of them forward). Though she had been built in 1917 and had much wood in her construction, many of her features were later found in American icebreakers.

The Cactus class 180 foot tenders were the next class of vessels with icebreaking characteristics. They had been designed by the Lighthouse Service prior to its amalgamation with the Coast Guard (1939) and naval architects introduced a cutaway forefoot and "slack" (rounded) bilges. The latter feature is more appropriate to ice work than squared bilges, as they allow the vessel to be forced upward by enclosing ice, lessening the danger of being trapped. There were thirteen of these 180 foot vessels. Two further groups of 180s ("B" and "C" classes) were built during the war, for a total of 26 additional vessels. The last of the *Mesquite* (180B) class went into service in 1943; the final Iris class (180C), in September, 1944. The vessels

proved to be credible icebreakers, able to handle up to 20 inches of ice, as well as versatile in other areas: antisubmarine warfare, convoy escort, weather station duty, etc.

Versatility also marked the career of the icebreaker *Storis,* a 230 foot tender commissioned in September, 1942. Her design was derived from the 180 foot class and she resembled those vessels in profile. However, she was nearly double their tonnage and given a third more horsepower in her diesel engines. (All the 180s and *Storis* were powered by diesels operating generators for single electric motors.) Though her keel was laid prior to the U.S. entry into World War II (July, 1941), *Storis* was designed as a supply vessel for Greenland, an island possession of Denmark. This northern island was vital to the protection of Allied Atlantic convoys, and proved to be vulnerable to Nazi encroachments early in the war. As the war progressed, the *Storis* and other Coast Guard vessels played a key role in maintaining the security and usefulness of this island. The *Storis* herself was capable of many missions, not the least of which was icebreaking: escort duty, patrol work, buoy tending, and medium endurance cruising. The vessel remains in the inventory in 1999..

The *Storis*, the 110 foot tugs and the 180 foot tenders gave the Coast Guard a sorely needed boost in numbers of up to date icebreaking vessels. However, none of these could be considered true polar vessels, with the qualities necessary to deal with heavy ice for extended periods. To meet this requirement the "Wind" class icebreakers were contracted in November, 1941. All the expertise gained in years of study on the subject bore fruit in these four (later seven plus the similar *Mackinaw*) vessels, making them the most powerful and strongly built such ships in existence.

The general characteristics of these icebreakers were based on those of the Swedish vessel *Ymer*. These included the utilization of a bow propeller, diesel electric powerplant, and relatively short length in proportion to the great power developed. The bow propeller, though considered useful for occasions when the vessel would be forced to back herself out of surrounding ice, was of more importance as a means of creating a wash which would force broken ice from the sides of the vessel. Relatively short length was required to allow the vessel to follow tortuous, winding leads through the ice. Diesel electric power was the most compact, economical, and powerful propulsion system, and had the advantage of flexibility of operation: a necessary trait for the operation of fore and aft propellers. Furthermore, the division between the power supply diesels and the motors which direct that supply to the shafts themselves is an important feature: the shocks and great power to speed ratios inherent in ice operations would seriously derange direct connected reciprocating machinery, but could be handled routinely by rotating (as opposed to reciprocating) electric motors.

These features were incorporated into the four original 269 foot Wind class vessels: *Northwind*, *Southwind*, *Eastwind,* and *Westwind*, as well as the Great Lakes icebreaker *Mackinaw.* (And, as will be seen, three further units of the same design eventually were added to the Coast Guard inventory). The vessels were 269 feet in length, 63'6" beam, and displaced 6,500 tons. The three propellers were driven by electric motors, which in turn were supplied power from six Fairbanks Morse diesels, for a total of 12,000 horsepower. The forward propeller was detachable and used only for dredging broken ice forward and creating a wash along the bottom of the vessel.

The hull of each of these vessels was of unprecedented strength and structural integrity. This was achieved first by close spacing of frames (16 inches apart), then by careful engineering design of the trusses and plating to resist 3000 pounds per square inch along the waterline. The hull plating itself was 1 5/8 inch in thickness and welded rather than riveted. These requirements were so imposing that only one builder submitted bids: Western Pipe and Steel Company, of Los Angeles. All four were completed in 1944.

Other notable features of these ships were compressed cork insulation in the hull; fore, aft and side heeling tanks with pumps to enable fast movement of water weight within the vessel to aid in "rocking" the ship free from ice; strengthened steering apparatus; and a padded "notch" at the stern in which to nestle the bow of any vessel being towed through the ice. The latter was necessary to prevent collisions which might occur should the icebreaker stop abruptly due to thickening ice.

Wartime exigencies prevented the Coast Guard from extended use of three vessels: *Northwind*, *Southwind*, and *Westwind*. The first was immediately transferred to the Soviet Union under Lend Lease; the latter two served in the U.S. the winter of 1944 and then followed *Northwind* to the USSR. The three were returned to the U.S. in the early 1950s: the *Westwind* to the Coast Guard in 1951; the *Northwind* and *Southwind* to the Navy in in 1951 and 1950 respectively. The two navy ships were turned over to the Coast Guard in 1966. In 1945 a fifth 269-foot cutter was commissioned in the Coast Guard to replace the *Northwind*, and she was also named *Northwind*. When the original *Northwind* was returned to the U.S. she was named *Staten Island* to distinguish her from her successor. *Southwind* was named *Atka* during her Navy service (1950 to 1966). Two other vessels were built to this design for the Navy: *Edisto* and *Burton Island*, which came under Coast Guard control in 1965 and 1966, respectively.

The final heavy icebreaker built during the war was the *Mackinaw*, a ship specifically for Great Lakes use. She was, according to Admiral Thiele, a "squashed down" Wind class vessel, with greater beam and length, but shallower draft than those vessels. Her powerplant and general design were those of the Wind class, but her hull was of mild steel, for fresh water operations. (The ocean going cutters were of high tensile steel.) This vessel was designed to extend the

operating season in Great Lakes ports, a strategically important task considering the essential raw materials originating on the Lakes: iron ore, coal, limestone, etc. The *Mackinaw* was commissioned late in 1944 and remains an important asset in the Coast Guard inventory, though her age has become a key factor in plans to replace her on the Lakes.

Coast Guard icebreakers saw World War II service in many non-icebreaking roles. However, their primary icebreaking task was in itself essential to the war effort, and in a few instances their icebreaking capabilities were combined with more warlike activities. On the home front, the movement of essential raw materials, such as iron ore from the Mesabi Range to the Eastern steel mills, was facilitated by icebreakers extending the ice free season. At least sixteen of the 180 class cutters operated on the Great Lakes beginning in 1943, and the *Mackinaw* saw her first service during the final winter of the war training Russian personnel in the operation of Wind class cutters. The Coast Guard provided additional icebreaking vessels by the expedient of chartering icebreaking ferryboats when necessary.

To the south, movement of materials, as well as naval vessels, from the Lakes to the Mississippi River required ice breaking during the winter months. This was accomplished by utilizing the ice plow. These "attachments" were capable of opening up a channel half again wider than the beam of their mother vessel, and thus allow sufficient "sea room" for typical river barges. Both Coast Guard river cutters and leased towboats used the plows extensively throughout the war. On the Pacific, at least three of the 180 class cutters saw icebreaking duty in Alaskan and Bering Sea waters. *Citrus* and *Clover* were assigned to assist in building LORAN (Long Range Aid to Navigation) stations in the area; and, with *Bittersweet*, were used in search and rescue missions from early 1943 to the end of the war.

On the Atlantic Coast the four Raritan class tugs and eight 180 class tenders were employed in harbor and canal icebreaking at various times during the conflict. Also, the old *Kickapoo* maintained her icebreaking duties along the Maine coast throughout the war. It should be pointed out that such mundane activities as harbor and canal icebreaking became considerably more important in wartime, particularly in view of the vital part Atlantic convoys played in supplying America's European allies.

Greenland waters provided the arena for the Coast Guard icebreakers' most visible contribution to the war effort. On April 9, 1941, President Roosevelt pledged U.S. support to Denmark in resisting any Nazi attempt to take the island. The security of the Western Hemisphere depended in part on preventing it from falling into enemy hands, as both escort and emergency vessels for the Atlantic convoys were based there. Consequently the Coast Guard became a major part of the Greenland Patrol, operating some 24 vessels in her waters, about eleven of

which were equipped for icebreaking. Among these were the veteran *Northland*, the 165 foot *Modoc* and *Comanche* (with their reinforced bows), the wooden icebreaker *North Star*, three 110 foot cutters, three 180 footers, the *Storis*, and finally, the old *Bear* (now part of the Navy, she was operated by Coast Guard personnel.) The new *Eastwind* and *Southwind* were also on duty in Greenland waters during the last winter of the war.

Under Commander Edward H. "Iceberg" Smith, the Greenland Patrol began in earnest in the summer of 1941, with orders from Chief of Naval Operations "to do a little of everything," as Naval historian Samuel Eliot Morison put it. This included keep convoy routes open, break leads through ice when necessary, search and rescue, escort and patrol duty, run surveys, maintain communications among Greenland and U.S. bases on the island, and report weather and ice conditions. Above and beyond these, the Coast Guard was to search out and destroy German weather and radio stations and keep supplies coming to isolated Eskimo and Danish communities.

The first American naval capture of the war was carried out by the cutter *Northland* in September, 1941 - three months before Pearl Harbor. In a surprise night raid, a German radio camp was seized, with three operators, their codes, plans and the vessel on which they infiltrated the island. Again, in 1944, the *Northland* destroyed another enemy radio shack, and, after a chase through thickening ice packs, forced the surrender of a German trawler crew. The German commander's sword became a decoration on the icebreaker's wardroom wall.

In October of the same year, another radio station was discovered and eliminated by the crew of the *Eastwind*, after a night plowing through ice. The captured Germans had come from the freighter transport *Externsteine*, which had become frozen in the ice near where the cutter had begun her previous night's sortie. In one of the most unusual captures of the war, both *Eastwind* and *Southwind* shelled the vessel and she surrendered.

A few heroics aside, most of the Coast Guard's Greenland Patrol duties were monotonous, onerous, and accomplished without fanfare. However, their contribution to the Battle of the Atlantic was far from an insignificant one.

At war's end, the Coast Guard's icebreaking inventory included only three heavy duty vessels: the *Eastwind* and the second *Northwind*, as well as the Lakes' cutter *Mackinaw*. The *Northland* was finally decommissioned in March, 1946, leaving only the *Storis* for medium duty icebreaking. There was no shortage of light icebreakers, however, as all of the Raritan class tugs and 180 foot tenders survived the war and remained active. Of the Algonquin class 165-foot

cutters, one was sunk by torpedo and four were decommissioned by 1947, leaving only the *Tahoma*, which remained active until 1953.

Within a year of the end of the conflict, the Wind class ships were to find a new and exceedingly challenging role, this time in the Antarctic, where their icebreaking capabilities would be put to the ultimate test. The role had originally been planned for the *Northland* in 1938, when she was scheduled to join the Byrd Antarctic expedition. The war shunted this mission aside until December, 1946, when Operation High Jump got under way, commanded by Admiral Richard E. Byrd. The new *Northwind* (II) was assigned to this historic operation, one which became the precursor for the subsequent Operation Deep Freeze expeditions of the 1950s.

The *Northwind* was to be joined by the Navy icebreaker *Burton Island*, but this vessel was not completed in time, leaving the Coast Guard cutter to do double duty. (The *Eastwind* remained on the Atlantic coast and in Greenland waters during the period of the expedition.) Operation High Jump proved to be a feat of epic proportions and narrowly escaped disaster on the polar ice. At one time or other, all eleven of the task force's vessels became trapped in unexpectedly thick ice, and three were holed and severely damaged. The *Merrick* lost her rudder and *Northwind* towed her over 1,000 miles to New Zealand for repairs, then returned. Not the least of the cutter's accomplishments was the opening of the Bay of Whales as a port: she pounded through an area a mile wide and two miles long in 63 continuous hours, encountering ice 10 feet thick, clearing the bay for offloading supplies to build Little America Four.

The Coast Guard would not return to the South Polar regions until 1955, but in the interim operated extensively in northern waters. After High Jump, the *Northwind* resumed the Bering Sea patrol in 1948, the first such patrol in eight years. In 1951, the *Westwind* returned from the Soviet Union and joined the *Eastwind* on the Atlantic. These vessels reverted to typical winter icebreaking duties.

New responsibilities arose in the Arctic areas in the late 40s and 50s. U.S. military bases in the region now required periodical resupplying. In 1955, Coast Guard vessels were involved in facilitating the construction - of the DEW (Distant Early Warning) line of far northern radar installations. Later, these same stations would require icebreakers for their resupply.

In 1957, the resupply of these stations resulted in the first transit of the fabled Northwest Passage across the "top" of North America. The cutters *Storis*, *Spar* and *Bramble* (the latter were 180 foot tenders), were to determine if vessels cut off by ice from escape to the Pacific, could break out to the east. The ships worked their way eastward for two months, far north of any semblance of civilization, and met the Canadian icebreaker *Labrador* coming from the

Atlantic. *Spar* and *Bramble* then continued to the East Coast. The *Spar* became the first American vessel to circumnavigate the North American continent.

Another Arctic operation of the 50s was the U.S., Canadian Beaufort Sea expedition. The *Northwind* participated in this and did pioneering work in exploring the McClure Strait (about 75 degrees North latitude).

The first Operation Deep Freeze to the Antarctic continent began in 1955, and marked the Coast Guard's return to that region. These vital scientific and exploratory expeditions became an annual commitment, involving at least one heavy duty icebreaker in each. The majority of the expeditions were accompanied by two icebreakers, but as many as four have been involved (in 1967, for instance, *Glacier*, *Burton Island*, *Southwind* and *Westwind* participated.) Their primary responsibility of course was in breaking paths for the conventional vessels carrying the bulk of the personnel and equipment. However, as was demonstrated in Operation High Jump, icebreakers were imperative for the safety of vessels which were not equipped to withstand ice pressures. Thus the traditional Coast Guard search and rescue mission took on a new meaning in these expeditions. Beyond these tasks, the icebreakers also participated in purely scientific work, such as meteorological and oceanographic studies. Also invaluable were the helicopters launched from the icebreakers. These aircraft provided a vast range of services: surveying, meteorological data gathering, transportation, and logistical support.

Coast Guard icebreakers participated in all Deep Freeze operations except that of 1958, which was accompanied by the Navy's *Glacier*. *Eastwind* and *Northwind* were assigned until 1966, when *Glacier* (now Coast Guard owned) made the first of her nearly sixteen consecutive trips to the Antarctic. Second in number of expeditions was the *Burton Island*, with ten to her credit by 1989. The last of the "Winds" to make a Deep Freeze cruise was the *Westwind*, in 1984: she was forty years old at the time.

With the Deep Freeze operations as a constant commitment, the need for new icebreakers was to grow in the ensuing years. No doubt Deep Freeze was a contributing factor in a congressional bill to appropriate funds for constructing a nuclear powered icebreaker in 1958, in the midst of the "Atoms for Peace" movement, which also spawned the nuclear merchant ship *Savannah*. Congress approved the measure, but the administration rejected it as prohibitively expensive, particularly in view of the other vessel needs of the service. The idea resurfaced in the subsequent session of Congress, but was again denied for similar reasons.

Though nuclear power was not adopted, the numbers of major icebreakers in the Coast Guard burgeoned in 1965 and 1966, as the result of an agreement with the U.S. Navy. A joint study on icebreaker utilization had concluded that efficiency would be served best by combining all icebreaking under the Coast Guard. When the Vietnam war began requiring increased

commitments of Navy personnel in Southeast Asia, one of the sources of these men was the Navy icebreakers, which were turned over to the Coast Guard in 1965 and 1966. A total of five were transferred. The *Staten Island*, which had been the first *Northwind* in 1944, and the Southwind (named *Atka* in Navy service) were two of these. Two others, which were identical to the "Winds" but which had been built for the Navy, were the *Edisto* and *Burton Island*. Finally, the largest American icebreaker, *Glacier* (the "Big G") was transferred. This vessel was built in 1954, and was essentially an enlarged "Wind." She was 309 feet in length, 74 feet in beam and 28 foot draft. With these transfers the federal icebreaking function was concentrated in the agency most historically fitted to carry it out. The Coast Guard now had eight major ocean going icebreakers. This number remained stable until 1968, when the *Eastwind* was decommissioned. She had been in service 24 years. The remainder of the fleet, though some as old as the *Eastwind*, continued their arduous assignments.

The 1970s brought new challenges for these ships, even as they were beginning to show their age. The discovery of oil on the North Slope of Alaska suddenly added a new dimension to Coast Guard duties in Arctic waters. The *Southwind* and *Staten Island*, operating in Alaskan waters contributed to the new oil boom. The *Northwind* surveyed the North Slope in 1971. The latter freed an icebound convoy of twenty tugs and forty barges en route to Prudhoe Bay in the same year. The upshot of new needs and aging vessels brought the authorization of the Polar Star class icebreakers, the first of which was laid down in 1974. These were the first newly built Coast Guard icebreakers since the "Winds" of 1944. It was hoped that several of these would be forthcoming, but budgetary constraints limited it to two: *Polar Star* and *Polar Sea*, both built by Lockheed Shipbuilding of Seattle, for approximately $50 million each. These ships, measuring 399 feet in length by 83 feet in beam, displaced over 13,000 tons and were designed to break 6.5 feet of ice at a continuous 3 knots, and 21 feet by ramming. Two separate propulsion systems were built into the ships: 18,000 horsepower diesel electric motors were for "normal" icebreaking, and 60,000 horsepower gas turbines were for heavy ice (up to 21 feet in thickness).

The new vessels incorporated computerized laboratories for "wet or dry" marine studies, a heated conning tower some 100 feet above the waterline, and reversible pitch propellers. The latter enabled the vessels to reverse direction without stopping engines, a characteristic particularly useful in icebreaking by ramming. High efficiency pumps and 400 ton capacity heeling tanks gave the vessels swifter response in rocking maneuvers in ice than the "Winds". The older vessels had a tank capacity of 250 tons and response time of 90 seconds; the new vessels decreased the time element to 50 seconds. Finally, much attention was paid to the habitability of these ships, for improved morale on extended cruises. Both ships were commissioned in 1976, and have served in both Arctic and Antarctic regions since.

From 1977 to 1987, the Coast Guard also added to its fleet of icebreaking tugboats. Nine 140 foot tugs were built to replace the aging 110 footers (the Raritan class). These vessels, such as the *Katmai Bay*, have increased icebreaking capacity over their predecessors, incorporating a portable bubble generator system. This air lubrication apparatus is designed to assist the hull in resisting encroaching ice and improves icebreaking performance at slow speeds. Seven of the tugs were constructed by Tacoma Boatbuilding Company; two by Bay City Marine, also of Tacoma, Washington. *Sturgeon Bay* was the last of these to be launched, going into the water 12 September 1987.

Though the numbers of smaller "light duty" icebreaking vessels was expanding, the Coast Guard's inventory of first-line icebreakers gradually decreased from the late '60s through the '80s, leaving the two "Polars" alone in 1989. First to go was *Eastwind,* in 1968, followed by *Edisto*, *Staten Island*, and *Southwind* in 1974, 1975, and 1976, respectively. *Burton Island* was decommissioned in 1978, and the remainder of the "Winds" (*Westwind* and *Northwind*) in '88 and '89. *Glacier* went out of service in 1987 but at present there is drive to preserve her as a museum ship. At this date, at least one (*Northwind*) remains in the "reserve fleet" (mothballs) awaiting final disposition and scrapping.

ICEBREAKERS: PRESENT AND FUTURE

As of this writing (1999), two major additions to the CG's icebreaking vessel fleet are in the works. First is the new CGC *Healy*, the first major icebreaker since the Polar class of the 1970s. Second is the replacement for the *Mackinaw*.

The latter vessel has been the subject of discussion for several years, with the Coast Guard desiring to replace her with more modern, cost-effective units, while many on the Lakes prefer to keep the old cutter on duty. At one time, a study was made wherein a completely new power-train was to be installed in her, with her hull remaining intact. Another plan was to replace her with two smaller-light duty icebreakers, obviating the large capital expense of constructing another major vessel. It appears that a large replacement vessel is to be built, with the *Mackinaw* possibly becoming a museum ship on the Lakes.

Meanwhile, the icebreaker *Healy* was launched in 1998, designed by both the Navy and Coast Guard. This new vessel is designated a Polar icebreaker/Research vessel and will have significant capacity for both roles. Measuring 420 feet long by 82 feet in beam, the 16,000 ton ship will have the power to break 4.5 feet of ice at three knots - continuously - or up to eight feet by ramming. Her diesel electric powerplant will produce some 30,000 horsepower and enable a range of 16,000 miles at over twelve knots.

On board, *Healy* will have quarters for the crew as well as over 35 scientists, whose work will be facilitated by six laboratories. Additionally, there will be sophisticated communications and computer systems and six science lab-vans. Large cargo holds, heavy-duty winches and cranes, dive lockers, and substantial open working decks will enable all types of scientific endeavors, both at sea, and in the Polar regions, particularly Antarctica.

Healy, of course, is named for "Hell-roaring Mike" Healy, the most famous captain of the old Revenue Service, and the man most remembered for his Alaskan and Arctic operations in the old cutter *Bear*. This will be the first vessel in the service named for him, and plans are now to have her commissioned in late 2000, after a trial run on the Northwest Passage.

OTHER ADDITIONS:

The USCGC *Polar Sea* became the first U.S. surface vessel to reach the North Pole on 22 August 1994. She sailed in concert with the CCCS *Louis S. Ste. Laurent*.