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John H. Maurer

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*Logistics considerations always influence strategy and fuel may be the chief of those considerations. Fuel requirements must always be satisfied. A critical quarter-century of American experience is discussed here.*

### FUEL AND THE BATTLE FLEET: COAL, OIL, AND AMERICAN NAVAL STRATEGY, 1898-1925

by

**John H. Maurer**

To the generation of Mahan and Tirpitz the battle fleet represented the "Queen" on the diplomatic and strategic chessboard of imperial rivalries. The battle fleet, formed around the capital ship, was the decisive weapon in the battle at sea. Battleships acted as "yesterday's deterrent" in the competition between the Great Powers.<sup>1</sup> Because of their importance in the balance of power, a decision concerning the movement of battleships from one station to another inevitably aroused a serious debate on strategy and foreign policy. In the decade before 1914, this type of far-reaching debate on the proper disposition of the fleet engaged the attention of policymakers in both the United States and Great Britain. In the United States this debate centered on whether the fleet should be concentrated in the Atlantic or the Pacific before the completion of the Panama Canal, and in Britain it was caused by the underlying tension between worldwide imperial commitments and the Admiralty's policy of

massing battleships in home waters to meet the German threat. Yet the disposition of the battle fleet often depended on logistics considerations as much as strategic dogma or a government's foreign policy. This essay is an examination of the relationship between the logistics problem of securing access to fuel supplies and American naval strategy during the first quarter of this century.

Probably the single most important logistics requirement of a navy at the turn of the century was a supply of coal. Capt. Asa Walker, who served on the General Board of the U.S. Navy, clearly states this fundamental importance of coal:

The modern man of war presents no canvas to the winds; within her bowels is an insatiable monster whose demand is ever for *coal* and still more *coal*. Every cubic inch of available space is filled with fuel, and when this is consumed the vast machine becomes an inert mass.

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Coal then may be considered as the lifeblood of the man of war, and upon its supply depends her existence as a living factor in the battle equation.<sup>2</sup>

In addition to coal, a modern navy required, of course, other logistics support: supplies of food and water, ammunition, repair facilities equipped with machine tools capable of refurbishing a ship's machinery and weapons, and drydocks capable of handling the largest warships; all were needed to ensure the operational readiness of the fleet. While it is impossible to ignore these elements, providing the fleet with its "lifeblood" of coal was the biggest logistics headache facing naval planners in this period.

The strategic axioms guiding naval policymakers of that age—concentration of the fleet and the closely related short war dogma—accentuated the Navy's appetite for coal. Although its fuel requirements could vary depending on its size and activity, a battle fleet consumed large quantities of coal even in port. One logistics study in 1912 estimated that the mobilization and concentration of the battle fleet in the Caribbean would require almost 300,000 tons of coal and the fleet would continue to need at least 150,000 tons of coal a month thereafter to conduct operations. Because fuel "is the largest single item to be supplied as to both weight and volume," this operation would have required all the colliers in the U.S. merchant marine in addition to those possessed by the Navy.<sup>3</sup> Of course, the mobilization, concentration, and operations of the battle fleet in the vast distances of the Pacific would need much greater logistics support. As the 1912 Summer Conference of the Naval War College reported, modern naval operations demanded "coal, coal, and more coal."<sup>4</sup>

An appreciation of the logistics constraints on a fleet's operations in this era can be readily gained by examining

the process of coaling a ship. Coaling was the bane of every crew's existence: it was dirty, back-breaking work. One commentator went so far as to say: "Coaling causes more desertions from the Navy than any other feature of the service." To take on coal, a battleship would return to a base where a stockpile had been established, or tie up alongside a collier in a calm sea sheltered by land. Coaling at sea was dangerous as collisions frequently occurred when the warship came alongside. Once alongside, relays of men entered the collier's hold, working a maximum of half-hour shifts, shoveling coal into bags. When it was filled, a bag would be hoisted by crane from the collier to the battleship. The coal would then be dumped down the battleship's coal chutes into its bunkers where it was leveled and packed into place. To keep up morale, the ship's band would play popular music while the men shoveled. Once started, this process would be continued nonstop until the bunkers were full. To get the ship ready for action in the shortest period of time, officers tried to hasten this onerous chore by timing the crew and attempting to set record speeds for coaling. A good crew could transfer over 100 tons of coal an hour but coaling a fleet could last several days. In 1899 and 1900 the Navy conducted experiments aboard the collier *Marcellus* and the battleship *Maine* to develop means to speed this process and permit coaling at sea. As a result of these tests the Navy began building in 1904 specially designed colliers capable of trolleying 800-pound bags of coal on cables rigged between the ships. Until these ships were ready, Admiral Dewey told the Secretary of the Navy, there were no colliers "suitable for accompanying the fleet and keeping it supplied with coal."<sup>5</sup> Even with their arrival, however, coaling remained a painfully slow process and proved impractical for ships while underway at sea; the operations of a fleet consequently remained

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circumscribed by the location of coaling stations.<sup>6</sup>

This constraint worked to the advantage of Great Britain. During the 19th century Britain produced and exported more coal than any other country. Coal was one of Britain's two major export commodities; it was calculated that nine-tenths of the tonnage of British exports consisted of coal. This coal helped to pay for the vast quantities of imported raw materials and food that Britain consumed.<sup>7</sup> As an outcome of this export business, British firms acquired a virtual monopoly on the world's coal trade and established coaling stations stretching around the globe. One reason for this commanding position was the unsurpassed quality of coal from Newcastle, South Wales, the Clyde, and the Mersey. Welsh coal out of Cardiff, considered the best marine coal in the world, was sought after by all navies. Nor were British governments above using this dominance of the seaborne coal trade as a weapon in its foreign policy.<sup>8</sup> Without access to her coaling stations, Britain's rivals found that problems of fuel supply could drastically limit the range of their naval operations, especially in distant waters.<sup>9</sup> In a perceptive (and comical) remark to Chancellor Bülow, Kaiser Wilhelm best described the dilemma facing the other Great Powers when trying to supply overseas naval deployments without British cooperation: "Aber wie der Chinese sagt, in pigeon English: 'If nor have got coal, how can do?'"<sup>10</sup>

The dependence on British bases and good will is well illustrated by the logistics problems of supporting Dewey's campaign in the Philippines during the Spanish-American War. In a now legendary telegram of 25 February 1898, Assistant Secretary of the Navy Theodore Roosevelt ordered Dewey to concentrate his scattered Asiatic Station at the British colony of Hong Kong to await the anticipated outbreak of war with Spain. The telegram warned

Dewey to pay particular attention to his fuel supplies: "Keep full of coal." Dewey's squadron was desperately short of all supplies: provisions, ammunition, and fuel. When he arrived at Hong Kong, Dewey received the rude shock of finding that he could not buy enough coal to meet his needs for a protracted campaign. The naval commanders of other countries also at Hong Kong had brought up all the existing supplies of Welsh coal to prepare their squadrons in case that war erupted from the Great Power rivalry in China. Dewey also learned that Japan, the other important source of supply in the Far East, intended to enforce strictly its neutrality in the event of war, thereby denying the American squadron coaling facilities. Dewey eventually found the coal needed, but only at the price of buying the collier *Nanshan* then en route from England. To carry provisions for his squadron, Dewey also purchased the steamer *Zafiro*. On 22 April, only a day before being ordered to quit Hong Kong by its Governor, Dewey's logistics preparations were completed when the cruiser *Baltimore* arrived with a badly needed supply of ammunition. While the destruction of the Spanish squadron in Manila Bay on 1 May relieved Dewey of that naval threat, it did not end his logistics difficulties. That supply problems were never far from Dewey's mind can be seen in his handling of the battle, when he ordered the squadron to retire because of a report (subsequently proven to be untrue) showing his ammunition supplies practically exhausted. At Manila Dewey had no means to communicate news of his victory because the Spanish Governor refused to let him use the Manila-Hong Kong telegraph cable. Dewey retaliated by dredging up the underwater line and severing Manila's link with the outside world. Only by sending the revenue cutter *McCulloch* to Hong Kong with two brief telegrams, requesting ammunition and troops to occupy Manila, could Dewey announce

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the victory over the Spanish squadron. Fortunately for Dewey, the British authorities in Hong Kong did not interfere with these communications.<sup>11</sup> There can be little doubt that without British cooperation, Dewey could not have mounted his successful campaign against the Spanish squadron in the Philippines.<sup>12</sup>

With the collapse of Spain's empire in 1898, the United States was burdened with the formidable strategic task of defending its newly acquired overseas territories. In the Far East, where the continuing unrest in China seemed to presage a Great Power confrontation, American military planners faced an especially difficult problem because of the great distances from the centers of production and command on the eastern seaboard of the United States. The isolation of any American forces in this region had been clearly demonstrated during the final stages of the war with Spain. At that time, it looked as if the Spanish Government would dispatch a squadron more powerful than Dewey's force to recapture the Philippines. This force, commanded by Admiral Camara, would be sent from Cadiz to the Philippines via the Suez Canal. To the members of the Naval War Board set up to guide American strategy during the war, there appeared to be little that could be done to reinforce and resupply Dewey to prevent defeat by Camara's squadron. Fortunately for the United States, the Spanish Government decided on peace before Camara's force passed through the Suez Canal.<sup>13</sup> The intervention in China, 2 years after the close of the war with Spain, confirmed the immense logistics difficulties in supporting American forces in the Far East. "To show the difficulty that is experienced in getting coal to our ships at Taku," Secretary of the Navy John D. Long wrote, "it is sufficient to state that it is shipped by our own colliers from Hampton Roads and from Cardiff, involving voyages of 12,000 to 14,000

miles."<sup>14</sup> Without adequate bases, the United States could not expect to repeat the triumph of Manila Bay against a better prepared foe.

America's "New Empire" would need to copy the British model and develop a system of bases and cable lines, with an isthmian canal as "lifeline," to support the movements of the fleet. Moreover, strategic concerns, and not congressional politics, should dictate the location of these naval bases.<sup>15</sup> In a report to the Secretary of the Navy, Alfred Thayer Mahan tried to show this relationship between strategy, bases, and fuel supplies:

Fuel stands first in importance of the resources necessary to a Fleet. Without ammunition, a ship may run away, hoping to fight another day, but without fuel she can neither run, nor reach her station, nor remain on it, if remote, nor fight.

The distribution and storage of fuel is, therefore, eminently a strategic question . . . the positions for storing, and . . . the quantity to be stored at each position, are amenable to strategic considerations.

Three principal requirements should govern the choice of location for a base: ready access for the fleet and proximity to the theater of operations, security from an enemy seizure or attack, and ease of transporting coal to the place of storage. Mahan called these three elements: "Position, Strength, and Resources." Thus,

a place suited for a strategic centre of operations for a fleet should equally be a position for a coaling station; because (1) there it will be near the fleet; (2) it will be under the shelter of the fortifications established for the position as a naval base; and (3) at the base should be accumulated all the resources of every kind, fuel included.<sup>16</sup>

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As can be seen from this report, considerations of fuel supplies should predominate in the location of the Navy's bases.

During the first two decades of this century the General Board devised guidelines on the Navy's base requirements that agreed with the tenets on logistics and strategy contained in Mahan's report.<sup>17</sup> At times, however, one base project might be the focus of attention rather than any comprehensive plan. An example of this occurred during the turmoil in China at the turn of the century when the Navy tried to win approval for the establishment of a coaling station in the Chusan Islands to counterbalance German, Russian, and British bases at Kiaochow, Port Arthur, and Weihaiwei. Despite such anomalies, there did exist an underlying pattern of base development guiding the Board's proposals.<sup>18</sup> Central to this pattern was the development of bases in the Caribbean to turn it into the "American Mediterranean" (to borrow RADM Henry Taylor's phrase). Guantanamo would be the most important base in this scheme, with a more advanced fleet anchorage at Culebra. These positions, unlike the major facilities along the east coast of the United States, stood directly in the path of any European power that might want to upset the Monroe Doctrine by seizing territory in the Western Hemisphere or attack the proposed isthmian canal. Not surprisingly, the Board also wanted the fortification and construction of coal storage facilities along the canal to protect and expedite the movement of the fleet from one ocean to the other. In the Pacific, the Board wanted as a minimum major fleet facilities in the San Francisco area and at Puget Sound. The Board also wanted a fortified advanced base in the Pacific: Pearl Harbor, Guam, and Subic Bay all were considered at one time or another. As can be readily grasped, the Board wanted bases to carry out two strategic tasks: defense of the Western Hemisphere and support for a transpacific

advance of the battle fleet to the waters around Japan.<sup>19</sup>

The arguments and recommendations put forward by the General Board, the Naval War College, and navalists like Mahan on the need for a comprehensive base policy derived from strategic considerations, received little support from the Government. The more rousing index of national power, construction of battleships, evoked more widespread interest than the development of coaling facilities. In 1916 RADM Ausrin Knight, President of the Naval War College, testified before Congress that for the price of only one battleship (\$15 million) all of America's possessions in the Pacific could be safeguarded by the construction of a major base at Guam. Yet in that same year, when Congress approved appropriations to build a "Navy Second to None," it continued to pass over proposals on base construction.<sup>20</sup> Moreover, it would not be unfair to argue that the development of Pearl Harbor as America's premier advanced base in the Pacific owed more to congressional politics than strategic considerations.<sup>21</sup> Administrative quarrels within the Navy between the General Board and the Bureau of Equipment on the location and number of bases certainly did not help the chances for an improvement in the logistic support of the fleet. The policy of the General Board remained consistent in wanting to concentrate on developing a few key positions required to carry out war plans. This view often clashed with the recommendations of the Chief of the Bureau of Equipment, who was nominally in charge of all matters relating to the Navy's coaling stations and coaling supplies.<sup>22</sup> The more famous fight, between the General Board and the Army over the location of the Philippine base, is another instance of how the Navy's vision of creating a string of bases could remain incomplete because of interservice rivalry.<sup>23</sup> The General Board nonetheless continued to

press for a comprehensive program of bases tailored to perceived strategic needs, despite the dismal prospects of it ever being adopted, because such a "policy should be prepared and available for those concerned, as the ideal to be sought."<sup>24</sup>

After the San Francisco School Board ordered the segregation of the city's Asia school children from its other students on 11 October 1906, the problem of developing bases in the Pacific acquired an immediacy because of the threat of war with Japan. The defeat of Russia only a year before showed Japan to possess the naval and military prowess to seize American possessions in the Pacific. Some even thought, like the novelist Homer Lea in *The Valor of Ignorance*, that the Japanese had the capability to invade and conquer the United States west of the Rockies. In this paper it is not necessary to show the genesis, evolution, and context of the various Orange Plans as this has been the subject of many fine studies;<sup>25</sup> however, the logistics arrangements for the advance of the battle fleet to the Far East were staggering, and deserve special consideration.

In the late autumn of 1906, the General Board drew up an operational plan, based on the previous summer's conference at the Naval War College, to serve as a guide for the movement of a battle fleet from the Atlantic coast to the Far East. Once again, American dependence on British coal supplies is apparent by the route the fleet would follow to get to the Pacific. Starting from Hampton Roads, the fleet would steam across the Atlantic to the Zafarin Islands off the coast of Morocco, where 5 days would be spent coaling. The next leg of the fleet's voyage would be through the Mediterranean Sea and Suez Canal to Aden and another 5 days of coaling. The fleet would then cross the Indian Ocean, coaling en route in the Seychelles Islands and once again in the Straits of Sunda, before setting out for

Philippine waters. Once in the Philippines the first task of the fleet would be the seizure of a base, as it was expected that the Japanese would overrun the American facilities at Manila Bay during the opening stages of any conflict. Because the Navy did not possess enough colliers to support this fleet movement, agents were to be sent abroad to purchase 197,000 tons of coal to be positioned in the Zafarin Islands, Aden, the Seychelles Islands, and Lampung Bay. This route, which is the approach a European navy would use to get to the Far East, shows the undeveloped state of American support facilities in the Pacific.<sup>26</sup> It also raises the important question of how much would a British government hinder the movements of the American battle fleet in a war against Japan after the conclusion of the Anglo-Japanese Alliance of 1902.

Subsequent war plans against "Orange," though adopting a trans-pacific advance of the battle fleet to the Philippines in place of the path around the belly of the Eurasian land mass, continued to be plagued by grossly inadequate logistics support. In the Administrative Section of the Orange War Plan of 1911, the General Board set out the importance of logistics preparations to a successful outcome of a campaign against Japan. "The logical development of the strategy of war with Orange demonstrates how absolutely all operations depend upon the logistics of war." The development of a plan of war against Japan would not have much meaning if it were not accompanied by improvements in the logistic support needed to maintain the fleet in the Pacific.

If the logistic means are lacking to insure the arrival of the full naval strength of a country in the area where the decisive battles of the war must be fought, and to keep it adequately supplied in that area, it is as overpowering a national calamity as a decided inferiority in

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the equality of the personnel and in the number and character of the fighting ships.<sup>27</sup>

Just as the fleet in this era was considered "unbalanced" in the number of battleships to smaller fighting vessels, the Navy in the Pacific was logistically unbalanced because it lacked support facilities and auxiliaries to carry out its operational plans.

To support its Pacific advance, the General Board wanted to establish coal piles with 200,000 tons capacity at five points: Puget Sound, San Francisco, Pearl Harbor, Panama, and Corregidor. This coal would have to be shipped from England or the east coast of the United States because the coal of the western states was not considered of high enough quality for efficient steaming. Because it did not possess enough colliers to meet even its peacetime requirements, the Navy was forced to depend on foreign companies to move coal to its Pacific bases inasmuch as American firms had failed to bid for the Government's business. The cost of transporting coal in 1910 was \$4.50 per ton to Honolulu and \$2.75 per ton to Manila. This General Board plan never came to fruition: in 1910 the Navy had no coal at Pearl Harbor, Panama, or Corregidor, and only 20,000 tons at San Francisco and 74,000 tons at Puget Sound. The gravity of the fuel situation was brought home once again in 1913 when the California state legislature passed the Webb bill limiting the amount of land that aliens could own. The Bureau of Supplies and Accounts reported that the United States had barely a quarter of the 175 colliers required to support the battle fleet on a voyage to the Far East. Assistant Secretary of the Navy Franklin D. Roosevelt ordered coal shipments bound for the Philippines be diverted to San Francisco and all Navy colliers on the west coast be made ready for service. The Navy also acquired operations on British colliers to accompany the fleet.

Despite these efforts, the Navy lacked the resources to keep the battle fleet supplied with the 200,000 to 250,000 tons of coal it would need every month to carry out its operations.<sup>28</sup>

Yet many American officers, like Capt. Sydney Staunton and Cdr. Clarence Williams of the General Board and the influential Gen. Leonard Wood, had come to view Japan as the most likely, and dangerous, antagonist the United States would have to face in a future war. They believed that the best way to deter Japanese military expansion was to move the battle fleet, or at least a sizable portion of it, to the Pacific. While acknowledging the logistics difficulties of such a move, they argued that only by shifting the battle fleet to the Pacific would an acceleration occur in base development.<sup>29</sup> These strategic recommendations were not only "heresies" to the majority of the General Board swayed by the Germanophobic Dewey, but were logistically infeasible because of the high cost of supporting coal-burning battleships in the Pacific. One estimate placed the cost of marine coal in the Pacific as five to eight dollars more expensive per ton than in the Atlantic. Overall, the maintenance of a battle fleet in the Pacific would raise Navy estimates by at least \$4 million.<sup>30</sup> The dollar sign, as much as contending strategic assessments, determined the location of the battle fleet.

In the Atlantic the logistics requirements of coal-burning battle fleets can be seen underlying the evolution of American plans for war with Germany. The technological constraints of refueling in this era provided limits on the capability of the German battle fleet. American naval planners correctly reasoned that a German battle fleet, attempting to strike at the east coast of the United States from German home ports, would need to stop to coal in the Azores before crossing the Atlantic. Once this transatlantic voyage had been completed, the German Fleet would



need to find a location, sheltered by land, where it could coal once again. Depending on the season, whether it was winter or summer, the German battle fleet would coal either in the Caribbean or along the New England coast before seeking out the American Fleet for combat. Naval War College studies estimated the German battle fleet would require 97 colliers and "would tax to the utmost Black's (Germany) ability to transport coal at sea."<sup>31</sup> American naval planners believed that their best chance for defeating such a scheme would occur after the German battle fleet had completed the leg of its journey from the Azores, but before it had a chance to coal in the Western Hemisphere. This required that a scouting force discover the German approach from the Azores, and that the fleet's battleships be concentrated to intercept and bring to battle the German Fleet.

One operational study of how this battle should develop bears a remarkable resemblance to Japanese plans of the interwar period to destroy the U.S. battle fleet as it advanced across the Pacific and before it could establish a secure base in the Far East.<sup>32</sup> In case the German Fleet managed to elude detection, American naval planners developed a wide range of plans to occupy, in conjunction with the Army, prospective locations in the Caribbean where the German Fleet could establish a coaling depot.<sup>33</sup>

The need to deny Germany a coaling station in the Western Hemisphere thus played an important part in the diplomacy of the United States in the period before the First World War. In a lecture at the Naval War College, Assistant Secretary of State Francis B. Loomis warned naval officers that a "certain government" meant to gain a "foot-hold in South America . . . This is a contingency which offers one of the most intricate and delicate problems that can be suggested by our future

relations in Latin America. The ultimate fate, declaration, scope and interpretation of the Monroe Doctrine is indissolubly connected with it."<sup>34</sup> President Roosevelt was constantly on guard to prevent Germany from acquiring a naval station in the Western Hemisphere. In a letter to Senator Henry Cabot Lodge, Roosevelt maintained that Germany might "hanker" after a coaling station in the West Indies under the guise of "commercial purposes."

It is the thin end of the wedge and I do not like the move at all. A coaling station is what Germany most lacks in our waters and the Kaiser could use this commercial station for warships. He is restless and tricky and this ought to be looked after. It is and always has been a danger point.<sup>35</sup>

As long as Germany did not possess a coaling station in the Western Hemisphere, its chances of defeating the American battle fleet would be greatly reduced.

In the spring of 1912 the German Government dispatched the most modern addition to their fleet, the battle cruiser S.M.S. *Moltke*, on a good will tour of American ports on the Atlantic seaboard. Instead of producing amity, however, *Moltke* created a sensation in the press that almost amounted to a "naval panic." The *Washington Post* ran an editorial on 1 June 1912 entitled, "Pride of Our Navy Outclassed." In the press *Moltke* was depicted as a warship that could rapidly strike across the Atlantic and attack the defenses of the soon to be completed Panama Canal before the slower American battle fleet could respond. The officers from the Office of Naval Intelligence who inspected *Moltke* paid special attention to discovering its steaming radius. In making the journey from Germany to Hampton Roads at the relatively fast speed of 15 knots, *Moltke* could steam about 3,000 miles; or in other words, it could make a voyage from Germany to

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the Western Atlantic. The intelligence officers discovered, however, that *Moltke* had made the voyage direct from Germany only by storing coal in "various bins about the gun deck and apparently all the broadside gun compartments were filled with coal." The speed and efficiency of the German crew in coaling their ship further impressed the American intelligence officers. With *Moltke*, Germany possessed a capital ship with a transatlantic steaming capability that seemed to upset previous estimates of the time needed for a German Fleet to attack American possessions in the Western Hemisphere.<sup>36</sup>

Of course, no German armada crossed the Atlantic to seize territory in the Western Hemisphere, and the most impressive demonstration of long-distance steaming by coal-burning battleships involved the Battle Fleet of the U.S. Navy—the voyage of the Great White Fleet. This celebrated 14-month cruise around the world by 16 American battleships, without any major mechanical mishaps, was an amazing engineering feat for a fleet of pre-dreadnought battleships.<sup>37</sup> It is possible to gain an even greater appreciation of the magnitude of this undertaking when the voyage of the Great White Fleet is compared to the long-distance naval movements of the other Great Powers in this period. The largest comparable movement of German battleships away from European waters took place in 1900, when the Second Division of the First Battle Squadron, a total of four battleships and thus only a quarter of the size of the American Fleet, was dispatched to help reduce the Taku forts guarding the approaches to Peking.<sup>38</sup> Perhaps the best known example of a fleet movement of this era is the ill-fated voyage of Admiral Rozhdenski's Baltic Fleet to the Far East during the Russo-Japanese War. Yet this fleet numbered only eleven battleships, five less than the number in the

Great White Fleet.<sup>39</sup> Even Britain's Royal Navy, with its worldwide security interests, never deployed more than seven battleships to the Far East in this period. In the words of one thrilled Congressman: "No other power, not even England, whose drumbeat is heard around the world, ever sent such an enormous fleet around the world."<sup>40</sup>

Behind the fine fighting facade presented by the fleet and the success of its diplomatic mission, the voyage of the Great White Fleet showed once again how completely dependent the United States was on the good will of Great Britain for its fleet movements. Without British supplies of coal, colliers, and bases, the voyage would not have been possible. In the decade after the Spanish-American War none of the General Board's recommendations for the establishment of coaling stations had been met, and the Navy's eight colliers were woefully inadequate to meet the logistics needs of supporting the battle fleet across the Pacific. In order to supply the fleet with the 430,000 tons of coal it consumed during the round-the-world cruise, the Government hired one Austro-Hungarian, seven Norwegian, and forty-one British ships to deliver coal to various ports along its route.<sup>41</sup> Despite these arrangements, the fleet frequently found itself short of coal because scheduled deliveries failed to arrive on time. In Australia and New Zealand the failure of British colliers in meeting their contracts caused Admiral Sperry "great embarrassment." At Auckland only three of the expected six colliers arrived; and at Albany, only four of the scheduled six colliers appeared. In a letter to his son, Sperry complained that Britain could make the American Fleet the "laughing stock" of the world by stranding it in Australia without coal to move. Only by inducing local coal dealers to cancel their contracts did Sperry find the coal he needed to complete the next leg of his voyage to Manila.<sup>42</sup> This episode in Australia only

too clearly shows the inadequacy of the logistics resources available to the United States in this period. As Senator Hale correctly observed, "the greatest fleet of formidable ships the whole world has ever seen" must depend "on the indulgence of foreign powers."<sup>43</sup>

The world cruise did benefit American naval planners by giving them important practical experience to serve as a guide in the fashioning of naval policy and war planning. One particularly useful exercise occurred when the battle fleet steamed 3,850 miles from Honolulu straight across the South Pacific to Auckland, New Zealand, the longest single leg of its voyage. Bags of coal stowed on deck supplemented what was held in the fleet's fully laden bunkers. This run showed that American battleships possessed the capability of steaming directly from Hawaii to the Philippines without coaling en route and still remain in good mechanical condition. The importance of Hawaii, as the location of the Navy's principal strategic outpost in the Pacific, was thereby heightened at the expense of Philippine base projects. The inability of the Army and Navy to agree on a site for a base in the Philippines certainly served to strengthen this contention, and on 8 November 1909 the Joint Army and Navy Board recommended that no major naval base should be established further west in the Pacific than Pearl Harbor. A fleet based on Pearl Harbor would "control the Pacific and provide strategic defense" of the Philippines and the west coast of the United States. In the Philippines there need only be established a stock of coal and a naval magazine that could be protected by the Army's guns on Corregidor. The Navy also learned that the time needed to move the battle fleet from the east coast to the Pacific was 75 days, rather than the earlier projection of 120 days. This time would be cut even further once the Panama Canal was completed. Armed with this experience,

the Navy could anticipate an earlier move across the Pacific in case of war with Japan.<sup>44</sup>

The vast distances to be overcome in a war against Japan in the Pacific ran contrary to the constraints imposed on operations by coaling and the short war dogmas of the age. Coal ried a fleet to its base; but the United States possessed no secure, well-stocked bases in the Pacific. Only by the dangerous expedient of establishing advanced bases as it moved could the battle fleet be supported in the Western Pacific. The logistics problems of coaling thus prohibited a knockout blow being delivered early in the war by the big guns of the battleline: a war with Japan instead would entail a protracted conflict centered on the bases set up along the fleet's line of advance. Mahan feared that this slow advance would enable Japan to "hold our till the American people weary of the war." Yet his operational plans to speed the tempo of an advance to the Japanese home waters were rejected by Naval War College planners primarily because of the limitations in steaming distance of coal-driven battleships.<sup>45</sup> As has been shown, American planners considered these limitations a distinct advantage in any coming conflict with Germany in the Atlantic; but in the situation of war with Japan, the problem of coaling in conjunction with the vast distances to be traversed in the Pacific would weigh heavily against the chances for success.

The dimensions of this logistics nightmare could be somewhat reduced, however, by the use of oil fuel in warships instead of coal. As a naval fuel, oil possessed many advantages over coal. Oil has roughly twice the thermal content of coal, which means that for any given weight of fuel and machinery a ship can steam twice as far. Moreover, oil can be stored throughout the ship and pumped to the furnace; thereby eliminating the need for stokers and reducing by half the personnel required to tend the engines. Oil also had

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the great operational advantage of permitting a fleet to refuel at sea from tankers.<sup>46</sup>

Beginning in 1897, the U.S. Navy experimented with oil fuel for marine engines, and by 1904 there existed an impressive amount of evidence showing its great potential in warship construction. Despite this evidence, the Navy moved very slowly in shifting to oil and lagged behind Britain in building oil-burning warships. Perhaps the most important reason for this caution was the fear that domestic supply would not be sufficient to meet the Navy's needs. In a letter to Secretary Geroge von L. Meyer, the Chief of the Bureau of Steam Engineering expressed this fear:

A deterrent affecting the use of oil to even our present limited extent has been the fear of a failure of the supply. With the general use of oil by all navies, which now seems inevitable, and the probable considerable increase in its use for commercial purposes, this uncertainty of supply might develop into a condition menacing the mobility of the fleet and safety of the nation.<sup>47</sup>

One way to ensure the Navy's supply of oil was to set aside rich oil lands in the western states and create a strategic petroleum reserve. On 27 September 1909 the Taft administration began the project by withdrawing lands in California at Elk Hills and Buena Vista Hills, that were subsequently organized 3 years later into Naval Petroleum Reserves 1 and 2. The Wilson administration added to these California sites the famous Teapot Dome reserve in Wyoming in 1915. Even with the creation of these reserves, many in the Navy Department continued to fear the depletion of domestic oil sources and dependence on foreign markets.<sup>48</sup>

In conjunction with the creation of oil reserves, the Navy began to adopt oil fuel for its battleships. Oil was first used in battleships in the "mixed firing"

technique where it is sprayed on burning coal to increase furnace efficiency by reducing ash. Not until the *Nevada* class, authorized by Congress in 1911, did the Navy decide to rely entirely on oil fuel for its battleships. With this step, not only battleships, but the entire fleet was committed to oil. Secretary Daniels correctly observed that the "recent tests of the *Nevada*, the first dreadnoughts equipped for the exclusive use of oil as motive power, emphasize the growing need of a large supply of oil for the Navy."<sup>49</sup> To shift to oil had important strategic consequences as well with regard to the disposition of the fleet. Oil fuel would be especially useful for warships operating in the Pacific. In 1907 one oil industry journal stridently called on the Navy to start construction of oil-burning ships for the Pacific:

With fuel regarded as the pivot upon which victory or defeat would swing in case of hostilities on the Pacific, inaction on the part of the navy department in equipping a Pacific squadron with oil-burning apparatus, can be characterized as nothing short of criminal negligence. It is [a] question of highest efficiency. If "full preparedness" is the watchword of the navy department, then it does not live up to it, if there is further delay in actively recognizing crude oil as fuel on board warships.<sup>50</sup>

Four years later, Chief Engineer Hutch I. Cone echoed these sentiments when he told a gathering of the Navy League that the construction of oil-burning battleships would greatly ease the fuel problem in the Pacific. Because oil fuel was cheaper than coal in the Pacific, and the proximity of the oil reserves to the coast ensured supply in a crisis, the earlier financial and transportation problems that kept the battleships concentrated in the Atlantic no longer mattered in deciding where to concentrate the fleet.<sup>51</sup>

By 1913, the General Board anticipated the gradual decline of coal consumption by the Navy as oil-driven ships entered the service. As a guide to policy, the Board moreover gave priority to the construction of fuel stations in the Pacific over those in the Atlantic. In the Pacific, where coal piles had not been established anyway in the quantity desired by the Board, the advantages of increased radius of operations of oil-burning ships would be more useful. Within little more than a decade of this recommendation, the Navy consumed the insignificant amount of 15,000 tons of coal annually in the Pacific even though the number of warships based on the west coast had increased dramatically.<sup>52</sup>

With the conclusion of the First World War and the surrender of the Kaiser's *Hochseeflotte*, Secretary Daniels ordered the creation of a powerful Pacific Fleet, commanded by Adm. Hugh Rodman, in the spring of 1919. The core of Rodman's fleet, eight new oil-burning battleships, passed through the Panama Canal and steamed north to a Presidential fleet review at Seattle on 13 September 1919. It is difficult to disagree with Braisred's conclusion that the movement of Rodman's fleet to the Pacific, in conjunction with the opening of a modern drydock at Pearl Harbor in August 1919, "epitomized the reappearance of the United States as a great naval power in the Pacific."<sup>53</sup> American naval strength in the Pacific was further augmented by the Navy Department's decision to replace four coal-burning battleships with four oil burners in the spring of 1921. While the Navy continued to lack adequate shore support in the Pacific to dock this fleet, this movement of battleships, and the shift in American strategic focus that it represented, ensured the gradual development of west coast naval facilities. The adoption of oil fuel greatly aided this shift.<sup>54</sup> The advantages of oil fuel were dramatically

shown by a cruise of the Pacific Fleet to Hawaii in the fall of 1920. On the voyage out the fleet speed was held down to 12 knots by the coal-burning battleships. This exercise convinced Rodman, and most other naval officers, that the ability to operate in the Pacific depended on oil. It also demonstrated the difficulties of operating coal- and oil-burning battleships together. No commander afloat would want to steam into battle with the flag-hoist signal: "Coal burners to the rear."<sup>55</sup> If the fleet was not encumbered by coal-burning ships its speed and tactical efficiency would be much higher. The lessons of these exercises can be seen in the recommendations of the Navy Department of the interwar period that the six coal-burning battleships be converted to oil. With this conversion the range of these battleships would almost double. The most impressive demonstration of the endurance and range of oil-burning warships in this period occurred, however, in 1925 when the American battle fleet steamed 13,000 miles to New Zealand and Australia after the conclusion of joint Army-Navy maneuvers in Hawaiian waters. Commanded by the former Chief of Naval Operations, Adm. Robert E. Coontz, this force, numbering 46 ships (11 of them battleships) and 23,000 men, was supplied during this cruise by the 13 auxiliaries of its own service support.

In Australia and New Zealand the battle fleet received a warm welcome, one paper called it the "mightiest armada ever seen in New Zealand waters." Coontz' force certainly dwarfed the British "Special Service Squadron," consisting of the two battle cruisers *Hood* and *Repulse*, that had visited Australasian waters 2 years earlier.<sup>56</sup> Thus even before the tragic "Andri-anople" of the British Empire in 1941, when the battleships *Prince of Wales* and *Repulse* went down, politicians and popular opinion in Australia and New Zealand recognized that their security

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depended on an American naval "umbrella" rather than the Royal Navy.

This shift to oil fuel had the added advantage that rival Great Powers were not as fortuitously endowed as the United States in domestic oil production. Oil industry bulletins estimated that Germany depended on the United States for 80 percent of its oil supplies in 1914. Because it did not possess domestic sources of oil, Germany continued to depend upon coal-fired machinery for its battleships through the First World War. This restricted the radius of operations of German capital ships and made virtually impossible the notion of raiding Allied sealanes in the Atlantic. The Japanese Empire, the other feared antagonist of the General Board before 1914, also lacked oil resources for its navy and depended on American and British firms for supplies. Japanese leaders knew that any naval competition with the United States would need to take into account the question of oil and not just comparisons of capital ship strength. Japan's vulnerable strategic position was graphically demonstrated in the use the United States made of the "oil weapon" during the diplomatic crisis before Pearl Harbor, and the stationing of their battle fleet in Southeast Asia, where it would be closer to the sources of oil production, instead of in the home islands before the great naval battles of 1944.<sup>57</sup>

Even Great Britain's naval supremacy, that had heavily depended on coal, was called into question by the shift to oil fuel for warship machinery. Despite the heroic efforts of Winston Churchill and Jackie Fisher, the earlier advantage of dominating the world's coal trade was rapidly being eroded.<sup>58</sup> To the doubters that questioned Churchill's oil policy, the First World War convincingly demonstrated the necessity of oil in modern war. Lord Curzon said at the time that the Allies "floated to victory on a sea of oil." The bulk of this oil, perhaps over 80 percent, came from the

United States.<sup>59</sup> A startling transformation had taken place during the course of the war, with the Royal Navy becoming dependent on American sources of oil. Moreover, the submarine peril demonstrated the precarious nature of this oil lifeline. During several months of 1917 the Royal Navy experienced a critical shortage of oil fuel: stockpiles were down to 3 weeks' supply as a whole and to 6 days' supply at some bases; limitations had to be imposed on fleet movements to conserve fuel.<sup>60</sup> The British Government was forced to send what one recent writer has termed, "urgent and humiliating" telegrams to the United States "warning that the Royal Navy would be immobilized unless the American government made available . . . the necessary supplies of naval fuel to Britain." In September 1917 the Admiralty director of stores reported that "without the aid of oil fuel from America our modern oil-burning fleet cannot keep the seas."<sup>61</sup> The American dispatch of four coal-burning battleships in November 1917 (with one more being sent later) to form the Sixth Battle Squadron of the Grand Fleet, rather than the more modern oil-fired battleships, shows how the problem of oil supply could affect naval deployments.<sup>62</sup> Reflecting on this wartime experience, Secretary Daniels wrote: "The war on sea and in the air as well as on land has depended so much on transportation that it can be laid down as a basic principle that no nation that does not control an adequate oil supply can successfully maintain its forces in the field."<sup>63</sup>

With the conclusion of the war, oil emerged as a major irritant in Anglo-American relations. The oil crisis of 1917 had graphically demonstrated to British leaders their country's critical dependence on American oil. As a way to decrease this dependence, the British Government tried to gain control of Middle East oilfields and exclude American companies from participation. In a

speech in March 1920 by the First Lord of the Admiralty Walter Long said that "if we secure the supplies of oil now available in the world we can do what we like," and that "the nation must take care to occupy the house, or others will take it, and with it the key to all future success."<sup>64</sup> The subsequent San Remo agreement between Britain and France a month later served to further fuel the antagonism between the United States and Great Britain. One commentator, writing in *The Fortnightly Review*, compared this antagonism to the imperial rivalries in the Far East: "The world is in danger of drifting into much the same sort of struggle over oil concessions as was waged twenty odd years ago over China; and the chief protagonists in the struggle threaten to be Great Britain and the United States."<sup>65</sup>

The U.S. Navy clearly recognized the political and strategic advantages of America's commanding position in world oil production. In a memorandum to the Secretary of the Navy dated 5 May 1911, the Chief of the Bureau of Steam Engineering drew attention to the "probability of an eventual demand for petroleum greatly exceeding the supply, together with the fact that we produce the greater part of the world's supply, should give us a distinct advantage over other nations. The control of our exports of oil might limit the extent of the adoption of the oil engine by our possible enemies." Two years later in a report to the Secretary of the Navy entitled "Supply of Oil Fuel at a Reasonable Price," Admiral Dewey strongly endorsed the adoption of oil fuel for the fleet: "The military advantages of burning oil, the advantage to the United States in being the greatest oil producing country, and the added advantage that the Navy has its own oil-bearing lands, are all so great that the return to coal burning could only be viewed as a calamity."<sup>66</sup> Oil would be the foundation of American overseas expansion much

as coal served to underpin British imperial policy.

Of course, the advantage possessed by the United States because of its oil production did not necessarily translate into improved readiness for the Navy. The compromise at the Washington Conference, whereby the Japanese accepted an inferior tonnage ratio for their capital ships of 60 percent of the American strength in return for the nonfortification Article XIX of the naval treaty, prohibited base development in the most likely theater of operations.<sup>67</sup> Given the tight-fisted policies of the Congress and Republican administrations during the interwar period, when it proved difficult to find funding for fuel to conduct large-scale maneuvers, perhaps the United States did not surrender much in Article XIX. Moreover, the Navy managed to offset partially its lack of bases by retaining the 35,000-ton limitation on battleships when both the British and the Japanese Governments wanted to establish an even smaller tonnage for capital ships.<sup>68</sup>

It must also be remembered that the other great naval powers found the problems of finding fuel supplies even more daunting. The establishment of oil stocks at British bases proved to be a favorite item for reduction by Treasury officials during the interwar period, and the development of the Singapore base, lynchpin of the Empire's security in the

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### BIOGRAPHIC SUMMARY



John H. Maurer was educated at Yale College and the Fletcher School of Law and Diplomacy, earning the Ph.D. degree in International Relations from the latter. He has presented papers before several international security

studies conferences and written reviews for this journal.

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Pacific, progressed only haltingly. During the Second World War, fuel problems frequently hindered British naval operations. One glaring instance occurred during the hunting of the German battleship *Bismarck*. On the run to the French ports, the pursuing British battleships almost had to call off the chase because they were critically short of fuel, and no tankers existed to refuel them at sea.<sup>69</sup> Nothing better shows the startling reversal of British naval fortunes. The U.S. Navy mean-

while overcame the sizable logistics problems of moving the fleet across the Pacific to the Japanese home islands during the Second World War. It is difficult to imagine this hazardous undertaking succeeding without the benefits of oil fuel. The foundation for America's naval supremacy after 1945 was laid over two decades earlier with the shift to oil fuel for the fleet. America's global military deployments continue to depend on this vital commodity.

## NOTES

1. Jonathan Steinberg, *Yesterday's Deterrent: Tirpitz and the Birth of the German Battle Fleet* (New York: Macmillan, 1965), *passim*.

2. Asa Walker, "The Battle of Manila Bay," Unpublished Manuscript, Record Group 14, Naval War College Archives, Newport, R.I.: 1900.

3. H.A. Dent, "A Supply Problem," Unpublished Manuscript, Record Group 14, Naval War College Archives, Newport, R.I.: 1912.

4. Report of Summer Conference, 1912, Part II: Strategic Problems, p. 65, Record Group 12, Naval War College Archives.

5. Dewey to Secretary of the Navy, 11 September 1905, General Board File 420, Operational Archives, Naval Historical Center, Washington Navy Yard.

6. John D. Alden, *The American Steam Navy* (Annapolis: Naval Institute Press, 1972), pp. 224, 229. See also photograph of the U.S.S. *Michigan*, coaling at sea from the collier *Cyclops* in Norman Friedman, *Battleship Design and Development, 1905-1945* (New York: Mayflower Books, 1978), p. 90. The best account of the changes brought to naval strategy and tactics by steam propulsion, and the fuel problems caused by coaling remains Bernard Brodie, *Sea Power in the Machine Age* (Princeton: Princeton University Press, 1941), pp. 78-123.

7. J. Ellis Barker, "Coal and Shipping: The American Danger," *The Fortnightly Review*, 1 February 1921, pp. 255-266.

8. See the important article by Lamar J.R. Cecil, "Coal for the Fleet that had to Die," *The American Historical Review*, July 1964, pp. 990-1005. Because of the difficulties in transporting coal from the Donets region to St. Petersburg, Russia's Battle Fleet depended almost entirely on imported British coal.

9. See Geoffrey Kemp and John Maurer, "The Logistics of the *Pax Britannica*: Lessons for America," paper presented at the Ninth Annual Conference of the International Security Studies Program, The Fletcher School of Law and Diplomacy, 23-25 April 1980. Britain's domination of international cable communications should not be ignored either. See Paul M. Kennedy, "Imperial Cable Communications and Strategy, 1870-1914," in Paul M. Kennedy, ed., *The War Plans of the Great Powers* (London: Allen and Unwin, 1979), pp. 75-98.

10. Cecil, p. 1000.

11. London had ruled that the belligerents should not send telegrams about their military operations through British ports. The authorities in Hong Kong, however, permitted American officials to determine whether their cables were about military operations.

12. William Reynolds Braisted, *The United States Navy in the Pacific, 1897-1909* (Austin: University of Texas Press, 1958), pp. 23-33.

13. *Ibid.*, pp. 28-32.

14. Quoted in Richard D. Challener, *Admirals, Generals, and American Foreign Policy, 1898-1914* (Princeton: Princeton University Press, 1973), p. 4. For the background on the development of American bases in the Pacific during the 19th century, see Seward W. Livermore, "American Naval-Base Policy in the Far East, 1850-1914," *The Pacific Historical Review*, June 1944, pp. 113-135; and Robert Erwin Johnson, *Far China Station: The U.S. Navy in Asian Waters, 1800-1898* (Annapolis: Naval Institute Press, 1979), *passim*.

15. On the General Board's policy on base development, see Daniel J. Costello, "Planning for War: A History of the General Board of the Navy, 1900-1914," Ph.D. Dissertation, the Fletcher School of Law and



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Diplomacy, Medford, Mass.: 1968, pp. 65-105, 173-225. Costello nicely describes the bureaucratic fighting between the General Board, where strategic considerations predominated, and the Bureau of Equipment, that was much more closely attuned to congressional politics on bases.

16. Robert Seager and Doris D. Maguire, eds., *Letters and Papers of Alfred Thayer Mahan* (Annapolis: Naval Institute Press, 1975), v. 3, p. 399. This report, dated 21 April 1911, should be compared with an earlier Mahan study on bases, dated 15-20 August 1898, *ibid.*, v. 2, pp. 581-591.

17. In a now famous clash with the Naval War College, Mahan favored developing bases in the Aleutians and at Guam in case of war with Japan, rather than the central Pacific route for the battle fleet advocated by the officers at Newport, see Robert Seager, *Alfred Thayer Mahan* (Annapolis: Naval Institute Press, 1977), pp. 483-489.

18. Bahia Hondo, on the eastern tip of Brazil, was another advanced site sometimes advocated by the Board for base development, see Challener, pp. 37, 97-98.

19. Costello, pp. 173-225, for an account of the General Board's base proposals.

20. William Reynolds Braisted, *The United States Navy in the Pacific, 1909-1922* (Austin: University of Texas Press, 1971), p. 196.

21. Braisted, *Navy in the Pacific, 1897-1909*, pp. 220-223.

22. During the first 2 years of its existence, the General Board became embroiled in an acrimonious dispute with Radm. Royal Bradford, Chief of the Bureau of Equipment. At one point, Secretary of the Navy, John Long warned the General Board that its usefulness could be impaired if this in-fighting continued. Henry Taylor came up with a solution that Dewey called a "master-stroke," namely, make Bradford a member of the General Board. See Costello, pp. 45-49.

23. See Challener, pp. 41-42, 227-228, 233-247. This rivalry was as much a personal feud between Admiral Dewey and Gen. Leonard Wood, as it was an administrative conflict. See Dewey's initial report on Subic Bay, Rear Admiral Dewey to Secretary Long, 28 August 1898, *Papers of John Davis Long* (The Massachusetts Historical Society, 1939), pp. 188-190. Mahan favored Subic over Manila Bay as well, see Seager and Maguire, v. 3, pp. 658-662.

24. Costello, p. 183.

25. In an early study at the Naval War College, dating from 1897, the possibility of an invasion of the North American continent by the Japanese was not ruled out, though it was considered unlikely: "It is admitted that the Japanese might coal either at one of the Aleutian islands or might take temporary possession of Puget Sound . . . for the purpose of coaling." Clearly, American planners at the Naval War College thought the most likely locations of an attack would be those places where the Japanese could coal their warships. For this early study, and for the background and development of the Orange Plan, see the excellent article by Michael Vlahos, "The Naval War College and the Origins of War-Planning Against Japan," *Naval War College Review*, July-August 1980, pp. 23-41. Also see the two books by Braisted, *Navy in the Pacific, 1897-1909*, pp. 191-231 and *Navy in the Pacific, 1909-1922, passim*.

26. Vlahos, p. 30. This approach to the Philippines would be suggested once again, by the British in 1941, when they requested the American battle fleet move from Pearl Harbor to Singapore. See James R. Leutze, *Bargaining for Supremacy* (Chapel Hill: University of North Carolina Press, 1977), pp. 130, 189-190, 206, 234-235, 241-242.

27. War Portfolio No. 2, Reference No. 5-1, Orange Plan, Administrative Section, General Board War Plans, File, p. 1.

28. Braisted, *Navy in the Pacific, 1909-1922*, pp. 37, 129.

29. See Captain Staunton's memoranda dated 23 June 1908 and 16 April 1912, and Cdr. Clarence Williams' memorandum of 16 March 1910, General Board File 420-1.

30. Braisted, *Navy in the Pacific, 1909-1922*, p. 28; and Paolo E. Coletta, "George von Lengerke Meyer," in Paolo E. Coletta, ed., *American Secretaries of the Navy* (Annapolis: Naval Institute Press, 1980), v. 1, p. 512.

31. Report of Summer Conference, 1912, Part II: Strategic Problems, p. 67, Record Group 12, Naval War College Archives.

32. Cdr. R.R. Belnap, "Tactical Question VI: Discuss the Fleet, in general and in action," Summer Conference, 1913, Record Group 12, Naval War College Archives; and Stephen E. Pelz, *Race to Pearl Harbor* (Cambridge: Harvard University Press, 1974), pp. 25-40.

33. On these various plans, see Challener, pp. 81-178; and J.A.S. Grenville, "Diplomacy and War Plans in the United States, 1809-1917," in Kennedy, ed., pp. 23-38. The best study of the Black Plan in this era is Warner R. Schilling, "Admirals and Foreign Policy, 1913-1919," Ph.D. Dissertation, Yale University, New Haven, Conn.: 1953, pp. 1-83. Unfortunately, Schilling's study does not incorporate material from the important archival holdings of the Naval War College; thus, this study should be supplemented by Costello, pp. 128-172. It is fascinating to note that American naval planners sketched a very accurate picture of German war plans; see Holger H. Herwig, *Politics of Frustration; the United States in German Naval Planning, 1889-1941* (Boston: Little, Brown, 1976), pp. 40-92.

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34. Francis B. Loomis, "The Influence of an Isthmian Canal Upon Central and South America," Lecture delivered at the Naval War College, 1901, Record Group 13, Naval War College Archives.

35. Herwig, p. 96.

36. C.C.G. Rapp to Commanding Officer of the U.S.S. *South Carolina*, 18 June 1912, Case 10548, office of Naval Intelligence. C.W. Woodward to SecNav, 29 June 1912, Case 10548, ONI. Howe to Captain of U.S.S. *Louisiana*, 15 June 1912, Case 11503, ONI. Also see the excellent article by Seward W. Livermore, "The American Navy as a Factor in World Politics, 1903-1913," *The American Historical Review*, July 1958, pp. 873-877.

37. On the voyage from the east coast to California, one battleship, *Alabama*, developed serious engineering problems when cracks appeared in its piston cylinders. Admiral Sperry, who commanded the fleet when it set out across the Pacific, blamed *Alabama's* problems on the incompetence of its captain and engineer officer. *Alabama* did not continue on with the fleet, but remained behind in California. The other "beast" of the fleet, *Maine*, "the greatest coal eater in the fleet," also remained behind in California. *Maine* was such a great consumer of coal that bagged coal had to be carried on deck to supplement that in her fully loaded bunkers. While en route to Rio, *Maine* sent frantic messages to the other ships of the fleet asking for coal. A furious Admiral Evans refused to stop the fleet and threatened to take *Maine* in tow into Rio. The officers of *Maine*, when faced by this embarrassment, worked out a stringent system of rationing coal to cut down on consumption. Two more battleships already on the west coast, the new *Nebraska* and the reconditioned *Wisconsin*, joined the fleet for the rest of the voyage thereby keeping the number of battleships at 16. On the design and characteristics of American predreadnought battleships, see John C. Reilly and Robert I. Scheina, *American Battleships, 1886-1923: Predreadnought Design and Construction* (Annapolis: Naval Institute Press, 1980), and for an account of the voyage, see Robert A. Hart, *The Great Fleet* (Boston: Little, Brown, 1965). See also, "The Cruise of the United States Atlantic Fleet," a journal kept by Radm. Charles S. Sperry, Letters 1906-1907, Sperry Papers, Library of Congress.

38. These four battleships accomplished little in the Far East. Upon reaching Singapore they learned that the Taku forts had already fallen and Peking relieved 2 weeks earlier. Despite this news, the four battleships remained in the Far East for another year. During this period they depended on British contractors for their coal and Hong Kong for major repairs instead of Kiaochow, which the Germans had seized in 1897. The difficulties could only seem to confirm the wisdom of Tirpitz' concentration of the German battle fleet in home waters.

39. Of these eleven battleships, only four could be considered first-rate fighting units, however. On the fleet's logistics difficulties, see the excellent article by Cecil. The Baltic Fleet was in such bad mechanical shape that the fleet's Chief Engineer, Eugene Politovski, wrote his wife: "Things have come to such a pass that I can only wring my hands . . . Such gloom overwhelms me that I feel inclined to hang myself." Denis Warner and Peggy Warner, *The Tide at Sunrise: A History of the Russo-Japanese War, 1904-1905* (New York: Charterhouse, 1974), p. 408.

40. Hart, p. 27. The calculations of the strength of the Royal Navy in the Far East comes from Michael Vlahos, "Historical Continuities in Naval Power Projection," Paper presented at the Ninth Annual Conference of the International Security Studies Program, The Fletcher School of Law and Diplomacy, Medford, Mass.: 23-25 April 1980. Also see Arthur J. Marder, *The Anatomy of British Sea Power* (New York: Knopf, 1940), pp. 302-319, 427-441.

41. No privately owned American colliers were available at the time of the world cruise to supplement the Navy's. See Hart, p. 55.

42. Australian coal proved to be much inferior to the British and American coal used by the fleet. The Fourth Division consisting of the battleships *Wisconsin*, *Illinois*, and *Kearsarge* (the *Kentucky* being left behind in Australia to round up deserters), which had the misfortune to be saddled with the inferior Australian coal, fell 2 days behind the rest of the fleet on the way to Manila because it was forced to steam at its most economical speed. Sperry to C.S. Sperry, Jr., 1 October 1908, Sperry Papers. Also see Hart, pp. 198-201, and Braisted, *Navy in the Pacific, 1897-1909*, p. 230.

43. Hart, p. 55.

44. It is perhaps worth noting that in Honolulu only one of the two chartered colliers arrived before the fleet set off for New Zealand. Braisted, *Navy in the Pacific, 1897-1909*, pp. 230, 237-238.

45. Seager, pp. 482-488; Seager and Maguire, v. 3, pp. 380-388.

46. For the advantages of oil, see Kemp and Maurer, *passim*, and Friedman, pp. 93-97. The advantage of refueling at sea was not used, however, until immediately before the Second World War.

47. J.O. Richardson, "Naval Petroleum Reserves No. 1 and No. 2," U.S. Naval Institute *Proceedings*, January-February 1916, pp. 105-106. Richardson later went on to become Commander in Chief of the U.S. Fleet and was relieved of this command in January 1941 by President Roosevelt because of the now famous dispute over the decision to keep the battle fleet at Pearl Harbor. See James O. Richardson and George C. Dyer, *On the Treadmill to Pearl Harbor* (Washington: Naval History Division, 1973), *passim*.

48. Richardson, "Petroleum Reserves," p. 123. Also see David A. Rosenberg, "The U.S. Navy and the Problem of Oil in a Future War: The Outline of a Strategic Dilemma, 1945-50," *Naval War College* Published by U.S. Naval War College Digital Commons, 1981

Review, Summer 1976, *passim*. On the early development of the Navy's oil policy, see John A. DeNovo, "Petroleum and the United States Navy before World War I," *The Mississippi Valley Historical Review*, March 1955, pp. 641-656.

49. Secretary of the Navy, *Annual Report*, 1915, p. 62.

50. DeNovo, p. 644.

51. Braisted, *Navy in the Pacific, 1909-1922*, pp. 28-29.

52. *Ibid.*, pp. 38-39.

53. *Ibid.*, p. 509.

54. On this shift, see *ibid.*, pp. 535-548; and Gerald E. Wheeler, *Prelude to Pearl Harbor* (Columbia: University of Missouri Press, 1963), pp. 58-67.

55. Wheeler, pp. 116-117.

56. On this cruise, see Robert E. Coontz, *From the Mississippi to the Sea* (Philadelphia: Dorance, 1930), pp. 446-464; Roger K. Heller, "Curtis Dwight Wilbur," in Coletta, ed., v. 2, pp. 621-623; Lawrence H. Douglas, "Robert Edward Coontz," in Robert William Love, ed., *The Chiefs of Naval Operations* (Annapolis: Naval Institute Press, 1980), p. 34; Stephen Roskill, *Naval Policy Between the Wars: Vol. 1, The Period of Anglo-American Antagonism, 1919-1929* (London: Collins, 1968), p. 289.

57. DeNovo, p. 649, n. 3, for German dependence on the United States for oil. German fears about interruption of oil supplies proved well-founded as the First World War showed. By the end of 1918, Germany possessed only a few weeks' reserves to carry on the war, see L. Grebber and W. Winkler, *The Cost of the World War to Germany and Austria-Hungary* (London: Oxford University Press, 1940), p. 45.

58. See Winston S. Churchill, *The World Crisis* (New York: Scribner, 1923), v. 1, pp. 133-145. Also see Kemp and Maurer, *passim*.

59. W.G. Jensen, "The Importance of Energy in the First and Second World Wars," *The Historical Journal*, 11, 3, 1968, pp. 543-544.

60. Arthur J. Marder, *From the Dreadnought to Scapa Flow* (New York: Oxford University Press, 1961), v. 1, p. 271.

61. G. Gareth Jones, "The British Government and the Oil Companies 1912-1924: The Search for an Oil Policy," *The Historical Journal*, 20, 3, 1977, pp. 657-658, 661.

62. Gerald E. Wheeler, *Admiral William Veazie Pratt, U.S. Navy: A Sailor's Life* (Washington: Naval History Division, 1974), pp. 103-104.

63. Secretary of the Navy, *Annual Report*, 1918, p. 138.

64. Roskill, p. 219.

65. Sydney Brooks, "Oil as an Anglo-American Irritant," *The Fortnightly Review*, 1 March 1921, p. 392. The United States showed its continued interest in Middle East developments. In the spring of 1919 President Wilson demonstrated this concern by dispatching the battleship *Arizona* to Turkish waters to reinforce the naval mission of Radm. Mark Bristol. A little more than a quarter of a century later, another famous American battleship, *Missouri*, would perform a similar mission.

66. DeNovo, pp. 647, 650.

67. On the Washington Conference, see Roger Dingman, *Power in the Pacific* (Chicago: University of Chicago Press, 1976), pp. 196-219. For the budgetary battles of the interwar period, see Wheeler, *passim*. On the problems of basing the battle fleet in the Pacific during the diplomatic crisis before the American entry into the war, see Richardson, *Treadmill to Pearl Harbor*, *passim*.

68. The Navy also wanted to retain 10,000 tons for displacement in cruisers. One General Board paper prepared for the Second London Naval Conference explains this relationship between strategy, bases, warship design, and arms control: "Naval strength is essentially a composite of fleets and bases. The United States has few bases throughout the world and no secure base in the Western Pacific . . . . In order that this handicap may be minimized, the United States needs vessels of the greatest practicable *power of survival* . . . . The capital ship is the essential basic unit of a high seas fleet. Reduction in displacement vitally reduces its power of survival." Cited in Pelz, p. 93.

69. Britain also faced enormous logistics problems when they arrived to support the operations of their Pacific Fleet at the end of the war against Japan, see John Winton, *The Forgiven Fleet* (London: W.H. Allen, 1970), *passim*.

