[Extracted from the United States Coast Guard's publication "The Coast Guard At War: IV, LORAN, Volume 1; http://www.uscg.mil/history/STATIONS/LORAN/docs/LORAN_Section_1.asp]

The two documents transcribed at the end of this chapter mark the first contact the United States Coast Guard had with that was to become one of the most revolutionary of long-range navigational side since the invention of the magnetic compass.

But it was not until almost a year later, in May 1942 that Coast Guard personnel participated actively in the development of Loran. Early that May the Vice Chief of Naval Operations requested of the Commandant, United States Coast Guard, the services of a ranking Coast Guard officer possessing radio on and electronic experience. This officer was to be detailed for special duty to the Vice Chief of Naval Operations.

The entire project was, at this time, so shrouded in secrecy, that neither Rear Admiral H. F. Johnson, Rear Admiral C. A. Park or Captain Irving L. Gill, Chief, Communications Engineering Division, USCG, the officer recommended, has any idea as to what the assignment involved, other than that it related to an electronic navigational device which might have war importance. Upon the signification of the Chief of Naval Operations that the then Lt. Cdmr. Harding would be an acceptable officer, Captain Harding received orders to report to the Chief of naval Operations on 25 May 1942 and was the immediately ordered to temporary duty in Cambridge, Massachusetts, the first week in June.

For purposes of clarification, it is necessary to backtrack in time at this point and give a brief summary of the national Defense Research Council, its origin, purposes and personnel, and why it should be of interest to the Navy Department.

NDRC, as the National Defense Research Council will be referred to hereafter, was the eventual outgrowth of early concern on the part of some of the nation's leading scientists over the unprepared ness of the United States in military technology. Progressing from 1939 to 1941 through various changes in nomenclature and purpose, this group of scientists, loosely held together by a presidential directive, gradually emerged as a subdivision of the more recently established Office of Scientific Research and Development, or OSRD.

Whatever their current designations, NDRC and OSRD were set up for the primary purpose of the developing as many new weapons and methods for waging war as possible, in the shortest possible time.

Since it is not deemed necessary for the completion of this record to trace the development of NDRC as Government Agency, a brief description of the status of NDRC at the time of the Coast Guard's entry into the picture, will suffice.

By 1940, NDRC had set up its various subdivisions of scientific military research. The radiation laboratory, a division of which was headed by Mr. Melville Eastham, was one of the most important. The Radiation laboratory division concerned with Loran was, for technological convenience. Located in the Hood Building, just off the campus of Massachusetts institute of Technology, Cambridge, Mass.

Its early staff included such scientists as Jack Pierce, ionosphere researcher; Prof. Jay Stratton of M.I.T., whose special interest was wave propagation; De. Curry Street, a past-master at handling electronic circuits; Dr. Fletcher Watson, astronomer, and many other. While, Dr. Alfred Loomis was not properly on the staff, his early interest in scientific military research has a strong influence on this group, and his personal financing of some of the early projects, kept them going until the series of aforementioned Government agencies was established. Dr. Karl Compton. President of M.I.T. was also on the leaders in the direction group.

The Radiation Laboratory was itself separated into Divisions, each Division concerned with some phase of radio. Division 11 was given a blanket assignment - "Develop aids to navigation". It is with only Division 11 that this document is concerned. As the war swung into its full stride, 1940 brought into scientific prominence a new use of a peacetime navigational aid. Known in peace as the "radio obstacle detector", Radar became an important defense against the blitz in England.

With radar, the Battle of Britain was fought and won, for the little RAF rose to fight, and fight again, forewarned in time by precision radio detection, that the enemy was coming over. Until the development of radar, the *radio beacon [****Radio beacons and Radio beacon Navigation", U.S. Dept. of Commerce, Lighthouse Service, by George R. Putnam, G.P.O. 1 July 1931***.] had been the only greatly used maritime long range aid to navigation, other than the ability of the navigator to obtain a navigational fix by means of a celestial sight, when weather permitted. The radio beacon's maximum reliable range is from 200-300 miles offshore. Its usefulness is to some extent limited by the effectiveness of the radio direction finder on the individual ship, and also, particularly in war craft, by the great difficulty of keeping radio direction finders in reliable condition under modern wartime ship maintenance stresses.

A development of World War I, the radio beacon had been put into effective use along America's coastlines by the Lighthouse Service, and was taken over for operation and expansion by the United States Coast Guard when it amalgamated with the Lighthouse Service in 1939. The Coast Guard also, at that time, took over the remainder of the shore direction finders, which were also used to some extent to supplement radio beacons.

When Sir Watson-Watt promoted the plan of ringing the south of England with radar, against the invading Luftwaffe, the attention of the world's scientists was fixed on the results.

Very early in 1941 a United States Army Colonel returned from England and assured certain members of the Radiation laboratory staff that the English had a pulse transmitting type of navigational aid which operated on a very high frequency and that it was suspected of exceeding in precision range that of Radar's 50-100 miles. He had made several attempts to discover details of its construction and operation, but the British were not, at that time of great national peril, disclosing any of their military secrets to a neutral, and he could state positively only that such a system did exist,

On the strength of the Colonel's statements, Dr. Brown of the Radiation Laboratory and Bell Telephone Laboratories made a hurried trip to England where, through widespread commercial

and scientific connections in the British Isles, he managed to gather a few salient facts about the British G-System.

With the attention all concerned concentrated on the performance of Radar, and with the existence of the G-System an established fact, Division 11 also concentrated on the development of a high frequency, shore-wave system. Eastham, Pierce, Stratton, Street and their staff set to work.

They were not at all sure what they were attempting to do. There was a possibility that they might develop improved radar, or a harbor entrance locator for convoys, or most anything. At this period, they were simply searching for something, anything, that might serve the nation when was actually came.

On 24 March 1941, the Radiation Laboratory received permits from the Treasury Department to occupy two United States Coast Guard Lifeboat stations, as experimental sites. These stations, specified in the documents at the end of this chapter, were destined to become the nucleus of a worldwide chain of long-range navigational aids.

To the layman, any scientific research, especially at government expense, tends to take on a dreamlike quality. Nevertheless, the early experiments leading up to Loran are worth a brief recording, since obviously long range navigation did not spring full blown from any one man's brain but was rather the result of teamwork of many persons and agencies.

As has been stated, the original experiments of NDRC Division 11 were attempts to develop a high-frequency pulse transmission system, based on Radar and the Laboratory's extremely fragmentary knowledge of the British G-System. The staff, under the guidance of Mr. Eastham drew up plans for a new type of transmitter and a receiver based on the principles of television, using the cathode ray tube to display the pulses generated by the transmitters. They let contracts for the construction and design of these to the General Electric Co. and Western Electric to the amount of nearly one million dollars.

Upon completion of the models, the transmitters were installed at the Fenwick and Montauk stations. The receiver was set up at the Bell Telephone Laboratory's Transoceanic Monitor Station at Mannahawkin, NJ. The installations were protected from interferences by shielded rooms of solid copper, rudimentarily air-conditioned, and costing from seven to eight thousand dollars apiece. Testing then began to determine just what had been developed.

Jack Pierce, who had made his scientific reputation in ionosphere research, endeavored also at this time to determine the range of the pulsed waves when bounced off the lower or E-layer of the Heaviside layer. At, first no attempt was made to achieve synchronization between the two transmitting units. Gregory and Waldschmitt, Radiation laboratory field men under the direction of Mr. Walter Tierney, Field Director for the Radiation Laboratory, concerned themselves primarily throughout the summer of 1941 with keeping the cumbersome transmitters on the air. A monitor-observer was station at Wannahawkin who communicated with the transmitting units by telephone, reporting to them the quality of their pulses on the air.

With war becoming more and more imminent, in late 1941 the members of Division 11 came to the unhappy conclusion that the high-frequency, short wave experiments were not producing any efficient or significant results despite the large expenditures of time and money. As late as October and November of 1941, Waldschmitt was still at Fenwick, achieving occasion synchronization, but still unable to keep the transmitters on the air with any regularity, or to obtain maximum reception of pulses from the Montauk unit at any time.

In the meantime, at the turn of the year, as Pearl Harbor put America on a belligerent basis, Pierce instigated a series of experiments with pulse transmissions on difference frequencies and wavebands. In February of 1942 he and Mr. E. J. Stephens went to Bermuda, where they made low power medium-frequency tests over water; (5 kw). Also, during the first three months of 1942, the Laboratory carried out a series of high-power, medium-frequency tests in the 1 to 2 me range. (30-50 kw).

These tests, while not conclusive in any way, indicated the possibility that greater distances over water could be covered then those covered already by Radar or radio beacon, through use of the medium-frequency ground wave. Not being military men, the staff of Division 11 was not concerned with its eventual military uses, but Mr. Melville Eastam considered the propagation of the ground wave on the new 2 mc. Frequency and its visual record on the cathode ray face, of sufficient importance to call to the attention of the Joint Chiefs of Staff.

At a meeting of representatives of the Joint Chiefs of Staff in late March 1942, Mr. Eastham presented the rather scant results of the medium frequency, long-range tests. He also proposed that the Radiation Laboratory establish a series of test units for this long-range system along the Atlantic seaboard, to determine the maximum range of the waves, and their possible development into an aid to navigation.

The final plan, as presented to the Chiefs of Staff, was for a chain of stations to be constructed, installed and operated by NDRC, the results to be submitted to whoever was most interested. Since the project appeared at this time to be developing into an aid to over-water navigation, the Army showed little or no interest in its pursuance, but Admiral Julius A. Furer, USN, Coordinator of Research and Development for the Secretary of the Navy, felt it worthy of some investigation and suggested that the Radiation Laboratory pursue the plan as presented and show the results to him. The outcome of this meeting was the joint decision that some of the test units desired should be constructed along the U.S. and Canadian Atlantic coast. This necessitated a presentation of the plan to the Canadian Government. Mr. Don Fink, ex-member of the editorial staff of "Electronics" and enthusiastic radio writer and reviewer, had joined the Laboratory group, and he was sent early in May to Canada, to obtain the support of the Canadian Government. He returned to Cambridge, Mass., May 15, 1942 with the promise of support of the Canadians, and assurances from the Royal Canadian Navy necessary for the Canadian test units, except technical equipment and technically trained installation crews.

From March 1942 until early May 1942, Admiral Furer had received no concrete information as to the practicability of the schemes or information as to how the establishment of the test demonstration stations was progressing. Feeling that there was a definite possibility that a new long range navigational aid might be developed as a result of the projected tests and perhaps

feeling that some guidance and assistance by the Navy was required, he took steps to place the Radiation Laboratory, Division 11 more closely under Navy Department observation. In consultation with Captain F. R. Furth of Naval Operations, Admiral Furer therefore took the action, which resulted in the arrival of Captain Harding at Cambridge.

This time in May, 1942 is probably the turning point in the development of Loran since the Radiation laboratory was beginning to arrive at tentative technical means for evolving a long range navigational aid and Admiral Furer, for the Navy, was alert to the Naval possibilities of such a device but recognized that in order to effectively apply the technical developments of the Radiation Laboratory to the needs of the Navy it would be essential for the Navy to actively guide and assist in the work. The far-seeing but practical naval viewpoint of Admiral Furer, Captain Furth and Captain Harding and the cooperative personal efforts of Mr. Melville Eastham, Dr. Alfred Loomis, and others eventually made possible the development and application of a practical system of long range navigation to the war effort in record breaking time for transition between Laboratory and field. If the Navy had not actively and aggressively sponsored the project and the leaders of the NDRC had not responded cooperatively from this time on the Navy guidance, it is doubtful if Loran would have actually reached general usage until very late in the war, if ever. There were many difficulties and rough spots on the road but on the whole it now appears that amazingly rapid application followed from the foresight of these leaders.

Foreseeing that if the Radiation Laboratory's experiments should develop another aid to navigation, it would eventually come under the jurisdiction and administration of the United States Coast Guard, Admiral Furer, in consultation with Captain Furth of the office of the Vice Chief of naval operations, decided that the logical contact between the navy and the Laboratory should be a qualified Coast Guard officer. It was, therefore, that on May 16 1942, the letter was written in the office of the Vice Chief of Naval Operations requesting the assignment of such an officer, (Captain L. M. Harding) to the office of Chief of Naval Operations. It should be noted here, that the project was still highly classified and the Navy still retained cognizance wholly although the use of Coast Guard property and a Coast Guard officer were involved.

Upon reporting to the Chief of Naval Operations, Captain Harding was given orders of great latitude. He was to be the Naval representative to the Radiation Laboratory itself, and to undertake any field activities necessary. He was to determine by any suitable means whether the transmission of long range pulse waves could be developed into anything of immediate value to a nation whose merchant shipping was being sent to the bottom at an alarming rate, and whose Navy, after Pearl Harbor, was totally inadequate to cope with the demands of convoy coverage. Captain Harding took up temporary duty at the Radiation laboratory, Cambridge, Mass on 3 June 1942.

On reviewing at this writing the whole story of Loran it seems probably that if the Navy's Admiral Furer and Captain Furth had not made the decisions and initiated the action which resulted in the assignment of Captain Harding to assist and guide this project, the entire Loran system might will have come to naught in this war. The NDRC scientists had for some time had some embryonic electronic information and experimental equipment, but had little concrete idea of the existing radio aids to navigation or the best application of such tools to the naval and air

war problems. Captain Harding had long been associated with air and marine electronic directions finding, radio beacons, radio ranges, blind landing, and similar air and naval essentials to navigation' and he was thoroughly conversant with existing electronic systems and further needs. The ensuring co-operative efforts of the NDRC the Naval Liaison officer and the complete backing of Admiral Furer's and Captain Furth's officers were required to make the project finally successful within a reasonable time; and a lack of team work in any single member of this group could readily have doomed the entire project as a war measure difficulties as Captain Harding and Mr. Eastham pressed plans for practical trials and shakedown to evaluate the developments quickly.

About May 15, 1942 , Don Fink returned from Canada with the assurance of cooperation from the Royal Canadian Navy. Early in June, at a consultation between Radiation Laboratory, Captain Harding, USCG and Commander Worth, RCNR, in Cambridge, it was planned that the two already practically established experimental station at Fenwick and Montauk, would be Units #1 and #2 respectively, and that Units #3 and #4 would be located along the Coast of Nova Scotia, at sites tentatively selected and agreed upon between U.S. Navy (Capt. Harding), Royal Canadian Navy (Commander Worth) and Radiation Laboratory (Mr. Eastham).

The Royal Canadian Navy speedily followed up its permission to construct, with the appointment of Lt. Comdr. Argyle, RCN, as Canadian Liaison Officer for Loran, and in June 1942 J.A. Waldschmitt joined Lt. Cdmr. Arglye in Halifa and they proceeded to make a site survey trip. On this trip they selected the actual sites for Units #3 and #4.

It may be helpful here, in explaining subsequent false starts, mistakes, etc. to note that first, the entire establishment of this chain was wholly experimental in nature; and second, that while the Laboratory has assured the U.S. Navy that it intended to undertake the job of establishing and operating the station chain, it was ill-equipped, except financially, to do so.

The staff was comprised of physicists, astronomers, mathematicians, electronic research men, and editorial workers. It obviously lacked personnel familiar with action naval transport or construction, civil engineering, naval logistics, operations, engineering, production, design and maintenance.

Several new men were added to the laboratory staff at about this time, including McKenzie, Davidson, Vissers, Taylor and Whipple. These men had some background in electronics, and some in civil engineering.

It became swiftly apparent to Captain Harding that, while the staff of Division 11 definitely had something in the results of their ideas and laboratory experiments to date, as far as further development went along practical lines they were in the position of a novice sailor at the wheel without a compass. Mr. Eastham, recognizing the situation, suggested that Captain Harding take over as manager of the project in regard to the establishment and operation of a test system and field trails, which were yet in the planning stage.

Due to the general nature of his orders from the Navy, and unwilling to be drawn into the Laboratory's administrative affairs, Captain Harding was able to counter with the suggestion that

he act as Naval Liaison Officer for the laboratory. His suggestion accepted and approved by Vice Chief of Naval Operations, he set to work to help correlate the disorganized field efforts of the Laboratory towards the early establishment of the practical trails.

In order to obtain concrete data on the behavior of the pulse transmissions Jack Pierce desired to observe them from some mobile test unit. Captain Harding was also extremely anxious to ascertain for the Navy as soon as possible, whether the whole project had practical, immediate value in the war effort, as the Navy could well use a precision aid to navigation extending beyond the radio beacon 200 mile radius, if it could be applied with sufficient speed to the actual wartime problems of navigators.

Captain Harding therefore arranged for observations and tests to be made from a Navy blimp, during June, and more important, he arranged to have receiving equipment installed on a Coast Guard weather ship, the USS MANASQUAN, so that an adequate navigational test might be made.

Davidson and Duvall, the latter a recent addition to the Laboratory staff and an ex-Naval officer and navigator, were assigned to conduct tests on the USS MANASQUAN, which continued for one month, from June to July of 1942.

The result of this shipboard test were of great interest to Captain Harding, for should they prove favorable, they would not only assure him and the Navy that long range navigation by pulse radiation was a practical possibility, but Mr. Duvall's records would give an indication as to the line that future development for such navigation would follow.

At about this time, Captain Harding coined the word "Loran" as a convenient designator for the project, deriving the word from "long range radio navigation". This was accepted by both the Navy and Radiation Laboratory.

Too technical a description of "Loran", is not necessary here but if the experiments on the USS MANASQUAN could be used to prove that a practically correct line of position could be obtained from the pulse transmission of one pair of stations at times when celestial navigation was impossible, then it would be reasonable to assume that navigational fixes could be achieved when within range of two pairs of transmitting units, and in all kinds of weather.

From March through May, Pierce, Stratton, Street and Woodward were continually striving to improve and simplify the transmitters and receivers, with Street and Woodward concentrating on developing the all-important timers on which the correct operation of the entire system depended. Practically all the very early pieces of equipment were prototyped right in the Laboratory, the famous "breadboard" modal being a good example. Meanwhile, Dr. Watson worked on tables and charts.

In June Lt. Comd. Argyle and Waldschmitt selected the site for Unite #3 at Boccaro, Nova Scotia. They had little difficulty obtaining rights to the site from the owner, a little old lady who was most patriotic. However she was quite startled to find contractors moving in almost the following day, even before the Canadian State Department had acquired the land.

Since the Radiation Laboratory was handling all construction costs for these two stations, contacts had been quickly let to local contractors, and no time was lost in beginning work, while Lt. Comdr. Argyle obtained official permits and clearances. Since the land had to be cleared before the supplies and equipment arrived from Boston, the contractor even employed ox-teams in removing the boulders.

They encountered a little difficulty in obtaining 65' poles for antenna masts, the only man nearby owning any of the desired length being reluctant to sell. His reluctance was not dictated so much by a need for the poles, but by an absorbing interest in some pigs he was raising, and it was only by tactful and prolonged interest in the pigs by both Waldschmitt and Argyle that the man was finally led into parting with this poles. The first two carloads of supplies and equipment for this unit left the states expeditiously through U. S. Navy facilities arranged by Captain Harding. They were dispatched on 10 June 1042, through the assistance of the Commandant of the First Naval District and his staff.

Argyle and Waldschmitt did not have quite an easy time acquiring the land for the second site, which they surveyed on 15 June 1942, near Deming Nova Scotia. A fisherman owned the land for this site with a dominating wife. She had a definite aversion against sailors being stationed anywhere near her home, and she was bitterly opposed to the "sins" of smoking and drinking.

The Loran representatives were not making much headway when a fortuitous accident furthered their cause for the. While sitting in the fisherman's home discussing the site, another caller arrived. He offered both Lt. Comdr. Argyle and Waldschmitt cigarettes, but since neither of the gentlemen smoke, they declined. Their refusal favorable impressed their hostess, who asked it they were also teetotalers. They fervently assured her that they were and from then on negotiations proceeded swiftly and smoothly.

A local contractor was engaged, and the site was swiftly cleared for construction. Supplies expedited by U.S. Navy shipment sponsorship arrived in the middle of June 1942 and ground was broken at Boccaro on 19 June and at Deming on 27 June. One shipment of supplies had been held up awhile through the refusal of a local Canadian freight agent to honor a USN bill of lading for necessary supplies the U.S. Navy had furnished. The contractor employed, had to, in effect, bail out his supplies by guaranteeing the freight charges.

The Royal Canadian Navy had already agreed to supply enlisted personnel to man the two Nova Scotian stations under construction, so in June several men were selected to train in operation and maintenance at the Radiation laboratory, and also at the two stations in operation at Fenwick and Montauk.

While the work on the Nova Scotia stations preceded with the joint efforts of the Radiation Laboratory, Royal Canadian Navy and U.S. Navy and field tests were being arranged, further thought was being given to installations to serve more important sectors of the North Atlantic.

The Radiation Laboratory had in general discussions talked about a North Atlantic convoy route, but beyond some visits to Newfoundland and Radiation Laboratory proposals that Canada operate such stations, little had resulted. Conferences between the Radiation Laboratory and the

U.S. Naval Liaison Officer (Captain Harding) resulted in proposals by the officer that instead of attempting to set up a continuous chain of stations as the Radiation Laboratory visualized, certain key sectors by groups of stations. The Navy continually emphasized the necessity for conserving time and speeding usable results if the system was to be of practical value in the war.

Accordingly, careful advance studies were made by Capt. Harding and the Radiation laboratory and Commander Donald B. MacMillan, USNR, the famed explorer, furnished invaluable advice and assistance in spanning the difficult gaps from Nova Scotia towards Europe. By the end of June, the general areas had tentatively been decided upon.

It was at this point of development and expansion that the Radiation Laboratory began to fully realize that it lacked by far the volume of trained personnel necessary to man stations for regular operation. Since it was increasingly hopeful that the system would prove of valve to the Navy, the Laboratory requested Captain Harding to obtain personnel either from the U.S. Navy or the U.S. Coast Guard to man the proposed Greenland station, and also eventually to man the units at Fenwick and Montauk. These men were to be trained along with the Canadians both at the Laboratory and the two stations in operation. At this time it was still planned for the Canadian Navy to man any Newfoundland-Labrador stations as well.

A survey party for sites #5 and #6 consisting of Commander MacMillan, USCR, Captain Harding, USCG, and Dan Fink of the Radiation laboratory departed Quonset, R.I. in a U.S. Naval seaplane, 15 July 1942, they stopped briefly at Shediac, New Brunswick to pick up Dr. Waldschmitt and Lt. Comdr. Argyle, RCNR, and continued to Newfoundland. This was the first really difficult foreign field survey trip since the two stations in Nova Scotia were in communities or areas served by public transportation.

The technique developed by Captain Harding during the survey for sites #5 and #6 served as a prototype for subsequent surveys. It was conducted by plane, small boat and on foot. The idea of a preliminary survey of the coastline from the air was Captain Harding's and proved efficient and economical in time and energy. The log of the above survey, as kept by Mr. J. A. Waldschmitt of the Radiation laboratory, after joining the party in the S-42 at Shediac, New Brunswick, 15 June 1942 follows:

After stopping briefly at Shediac to pick up Lt. Comdr. Argyle and Mr. Waldschmitt the flight continued to Newfoundland that same day. Bad weather in the Newfoundland Mountains forced them down at Day of Isles where they spent the night. On 16 July they took off again and after a short stop at Botwood, Newfoundland, proceeded by air, the same day, to Bona Vista.

On 16 July, the site for #5 was finally selected; near Bona Vista, on a point jutting out to sea. Contact was made with the local contractor the Laboratory intended to employ for the construction, a man by the name of Heber Way and arrangements were made with him to accept consignments.

On 17 July, the party left Bona Vista by air, and returned to Botwood where they were held over by band weather conditions. An amusing incident occurred to Waldschmitt at the Canadian air base here, on the morning of the 18th. Rising late, he had decided to forego breakfast in favor of

an early lunch, and was sitting in the officers club with the rest of the party, they only member of the group in civilian clothes.

He felt a tap on his shoulder, and turning around, found a U.S. Brigadier General, complete with numerous aides, inviting him to breakfast with them. Waldschmitt was thoroughly baffled but accepted. After breakfasting with the general and spending part of the morning with him, returned to his own party no wiser than before as to why he had been selected for such a signal honor, or as to who the general might be.

This particular air base was at that time a focal point for transatlantic air travel and many celebrities passed through daily. The survey party members still think Waldschmitt was mistaken for a youthful European king who was at the base the same day.

The weather cleared and about noon on the 18th the survey party left Botwood for Battle Harbor, Labrador. They landed at St. Mary's, Battle Harbor, and Stanley Brazil, quite a local character, came out to the plane with his small boat and ferried the party ashore. Brazil was an old friend of Commander MacMillan and turned out to be the local tycoon, being owner of the general store, postmaster, judge, etc. He quartered the party in his house for the night and proved most helpful in many ways.

The following day 19 July the party surveyed the shoreline of the vicinity in Brazil's launch the "Lily". An unnamed point was agreed up for the site of Unit #6 and the party went ashore surveyed it thoroughly marked necessary points with cairns or rocks and christened it Loran Point.

20-21 July the party was weather-bound at Battle Harbor. During those two days Brazil was appointed as local representative for the Laboratory and all preliminary arrangements were made with him for accepting consignments to be shipped. On the 22nd, the plane finally got through from Botwood, picked up the party and proceeded to Goose Bay, Labrador.

At Goose Bay, arrangements were made with the Canadian McNamarra Construction Co. to act as general representatives and contractors. On 23 July the party flew to Shediac, N.B. where they stayed overnight and where Comdr. Argyle left the party to expedite acquirement of the selected sites. On 24 July the rest of the survey party flew back to Quonset Point, Rhode Island.

While Waldschmitts' notes were colorful, Captain Harding's notes are those of the NLOL and they cover the practical consideration of site selection. The following excerpt is quoted;

"Airborn [sic] survey conducted 17 July thru 24 July 1942 along Northeast coast of Newfoundland, Labrador, Davis Straits and vicinity. Site selected near Bona Vista light, Newfoundland for first station."

"In Labrador, working out from Battle Harbor, selected point just north of False Harbor shown on British Admiralty charts, after rejecting various other sites around Cape Charles, Tiloey Island, Wall Island. Collected all necessary data on local radio interference situations, winter transportation, mail, medical services, contractors, and supplies. These two sites are

compromises but are best obtainable to cover the first leg of Nova Scotia to Greenland gap and were selected with due regard to minimizing the eventual problem of getting across Davis Straits, where a long base line is inevitable."

"Present prospects are that stations can be gotten in this season if Radiation Laboratory delivers the technical equipment and Canadian navy carries through the construction and manning of same expeditiously. The sites are both isolated, transportation difficult, and winter weather conditions bad so it will require real effort by all hands to get Loran trials under way in northwest Atlantic this season."

Future events in the construction of these two stations proved Captain Harding warnings only a mild forecast of actual happenings.

Upon his return to Cambridge, Captain Harding found the results of the tests made on the USS MANASQUAN which had been completed 17 July awaiting him. These tests which were primarily to determine the service range of the Loran system, showed most satisfactory results. The ground waves were efficient up to 680 miles in the daytime when the reflecting Heaviside layer was affected by the sun, and were effective up to 1,300 miles at night when the Heaviside layer was reflecting the sky waves to earth.

Captain Harding lost no time in reporting his findings to the Vice Chief of Naval Operations and to Admiral Furer with probably a strong recommendation that the trial chain covering the Northwest Atlantic be pushed into operation as quick possible. It should be here noted that this was still a preliminary trial, which furnished only a test of the probable service range of a Loran system and some practical data on single "lines of position". Three or more operating stations in a system would still be required for full trails.

Since it was becoming more apparent every day to the NLOL that the navy would eventually have to take over the major burden of construction and operating personnel for the station under the jurisdiction of United States, he probably brought this situation to Admiral Furer's attention at the same time.

The result was a Navy directive for the project, calling for a complete trial system of two United States units, (Fenwick and Montauk) two Canadian units (Bona Vista, Newfoundland and Battle Harbor, Labrador), and sequent survey. These five units, together with the two already under the jurisdiction of the Royal Canadian Navy at Boccaro [sic] and Deming, would give complete skeleton Loran coverage of the Northwest Atlantic area.

It was during the months of June and July 1942 that cracks began to appear in the NDRC program so optimistically presented to the Joint Chiefs of Staff by Mr. Eastham in March. As time went on these cracks developed in such number as to break the entire fabric of the original program, and eventually throw the entire burden of Loran system establishment onto almost entire dependence on Radiation Laboratory for basic electronic equipment fabrication.

The Royal Canadian Navy was still expressing itself as prepared to furnish operating personnel and maintenance and supplies to all four of the proposed Canadian units. It was to furnish

housing as well for the two Newfoundland-Labrador units. The Radiation Laboratory, however, was encountering increasing difficulties in supplying adequate operating and maintenance personnel for the two original units at Fenwick and Montauk.

The Laboratory's predicament is not difficult to comprehend in the light of a few basic facts. While the staff of the Radiation Laboratory was undoubtedly composed of brilliant scientists, very few had any practical experience in the operation and maintenance of a transmitting station. The ranks of available, competent radio operators and maintenance technicians were meanwhile thinning swiftly as increasing numbers of civilians entered the armed forces.

While the laboratory itself may not have realized the future personnel complications in store, it is apparent that Captain Harding did. Shortly after being informed by the Vice Chief of Naval Operations that the United States Coast Guard would probably supply the sic Radiomen requested to be assigned to the proposed Greenland unit, for preliminary Loran training at Cambridge, Captain Harding requested the VCNO to also assign some officer personnel for training.

At about this time. Mr. Eastham had independently convinced the Army that an airborne Loran receiver was practicable. This action suddenly stimulated the War Department interest in Loran particularly since the English had sent George Dippy one of their foremost G-System men to America to work with our scientists on Loran and Radar. Mr. Dippy, who joined the group at the Laboratory sometime after Captain Harding had been able to assure the U. S. Army that some of the RAF's most successful bombing raids had been directly due to the use of the G-System.

Unfortunately, the Army did not assign Liaison Officer to the Laboratory, and it fell to Captain Harding's lot to not only attempt to coordinate the representations made by the Army to the Laboratory, and the activity resulting therefrom, but to endeavor to keep the staff of Division 11 interested in steadily concentrating on the establishment of the seven-unit chain as a priority project.

While Captain Harding was coping with the above complication, he was steadily being called upon to aid increasingly in the collection of supplies for Battle Harbor and Bona Vista, which were hastily being assembled. For a time, all hands turned to**,** drawing up plans, and starting the shipments, of supplies and equipment flowing northward.

The partial shipments by Navy-arranged common carrier covered a very involved and complicated route, going first by rail to Sidney, Nova Scotia. From there they were shipped across the Strait of St. Lawrence, and from that point went by narrow gauge to Bona Vista, Newfoundland. The shipments to Battle Harbor went from Sidney across the Strait, then by narrow gauge railway to Cornerbrook, then by coastal steamer to a point in Labrador, where they were transshipped by small boat to Battle Harbor.

Much was learned, however, in this process, concerning packing and shipping this particular experimental equipment as much of it arrived damaged through improper packing and handling. This impeded getting the units into operation somewhat, but also served as a guide to what to avoid in packing future shipments, as well as emphasizing to the Radiation Laboratory

the value of supplying spares in equipment from the start, something they had shown little interest in to date.

While the Bona Vista and Battle Harbor surveys were being made, Mr. Vissers, one of the field staff of the Laboratory, had relieved Waldschmitt as Radiation Laboratory representative at Baccaro and Deming, and remained in that area about a month, pushing the construction work on both stations. He was then relieved by a party from the laboratory consisting of Jennings. Davidson, Lawrence, Pote, and McKenzie who arrived at Baccaro. Davidson and Jennings went on to Deming, where they supervised the construction for a month or more, and after the equipment arrived, began preliminary test operations. Lawrence and Pote acted in rather a liaison capacity between Baccaro and Deming, and McKenzie superintended the majority of the Baccaro construction. Then Lawrence and Pote returned to Boston, McKenzie took over the completion of the Deming unit.

Very late in July 1942, Mr. Vissers left units #3 and #4, when relieved by the above mentioned party, and with Henson went to Battle Harbor where Mr. Brazil had already started the local contractor on the construction of Unit #6. They supervised construction and installations there, and Vissers returned to Bona Vista, leaving Henson in charge.

All during the construction of the two Nova Scotia stations and the two Newfoundland-Labrador stations, Lt. Comdr. Argyle, RCNR, acted as general expediter, liaison officer and engineer advisor, and much credit is due him for the speed of the work.

At Bona Vista, Vissers was joined by Ken Taylor, another Radiation Laboratory field man, and together they put Unit #5 on the air, testing. Captain Harding's report to VCNO for the month of July 1942, reported that the first field trails of three-station fixes were made by Bell Telephone Laboratory under Radiation laboratory and Navy sponsorship in this month, by means of truck mounted receivers operating in the New Jersey area..

The July 1942 NLOL report also included the information that NDRC had set up in the Radiation Laboratory at Navy request under the direction of Dr. J.A. Pierce, training equipment and a tentative instruction plan for personnel.

The next step was the siting of the Greenland station, #7 in the seven-unit Northwest Atlantic chain. The following log, kept by J.A. Waldschmitt, of the Radiation Laboratory, gives one view of a graphic picture of a most efficient piece of work.

6 August 1942 - Commander Mac Millan, Captain Harding and Waldschmitt depart Quonset, R.I. in a Navy C-47 1st Naval Squadron Ferrying Command, to Goose Bay, Labrador.

7 August 1942 - Took off for Greenland in PBY assigned to Captain Harding but were turned back by weather after crossing entire Davis Strait

8 August 1942 - Detained by bad weather, accompanied plane on rescue mission

9 August 1942 - Flew to Greenland (BW1) where they met Captain Von Paulson, USCG, SNOP, Greenland and stayed overnight

10 August 1942 - Made an air survey flight along the coast for Cape Farewell to Cape Desolation, during which only one likely site near Federiksdal, and several poor alternates were finally found. Returned to BW1

11 August 1942 - Depart BW1 on USCG AKLAX, Captain Olson, bound for Federiksdal

12 August 1942 - Went to assistance of USS ARMSTRONG, which was on the rocks and abandoned by the Army. Commander MacMillan insisted she was salvageable, and after a bit of work she was later gotten off and dispatched to a repair base

13 August 1942 - Party landed at Federiksdal, a primitive native Eskimo village

14 August 1942 - A tentative location and site were selected near the Eskimo village and two miles from a beach suitable for landing.

15 August 1942 - Party returned to BW1. Here Captain von Paulson had inquired of Army Engineer representatives as to what type of immediate construction aid they were prepared to furnish. The Army tentatively agreed to put up the "CCC Barracks type building, 20' x 120', and a small storage building , and also to build a skidway to facilitate landing supplies.

16 August 1942 - Waldschmitt, Commander MacMillan and Captain Harding flew back to Goose bay, Labrador, and released the PBY to return to operational work.

17 August 1942 - The party proceeded to Presque Isle from Goose Bay and then to Boston by air transport facilities.

From Captain Harding's notes on the same survey, are the following "from May [sic; August?] 5 to August 18, 1942, conducted airborne and surface craft surveys along southwest coast of Greenland and selected best compromise site near primitive Eskimo collection of igloos called Federiksdal on Danish charts. Serious problems of strong winds, field ice from Cape Farewell and Greenland government objections to naval establishments near Eskimo buildings, but there is no satisfactory technical alternative between Cape Farewell and Cape Desolation. The survey was accomplished rapidly by combination of expert flying by PBY pilot Kand and cooperation and seamanship of Ensign C. L. Olson, commanding USCG AKLAK, assigned by S.M.O.D. Greenland. Final details of survey accomplished by landing party with obvious interest by Eskimos and friendly cooperation through their evident respect for Commander MacMillin and their delight in finding that he spoke their tongue. Much information on local condition of ice, wind and weather obtained from Eskimos but some of it conflicting, raising doubt as to its reliability because of their friendly desire to please."

Upon his arrival back in Cambridge, Captain Harding relayed the location of the selected Greenland site to VCNO, who requested the United States State Department to acquire the site from the Greenland Government. Prior to departure for Greenland, concerned lest efforts should

lag in the United States while he was absent, Captain Harding urgently requested an assistant and Lt. D. C. Cowie, USCG arrived at Cambridge the same day Captain Harding left for Greenland.

Until the 23 August when he left to form a survey party in the Aleutians and Bering Sea the NLOL and his assistant were very busy. The enlisted personnel for training had been selected and were to report to Dr. Pierce during August. Preparations for the course had to be completed. Also, before leaving on what might prove to be protracted duty in the Pacific, Captain Harding had to get in motion the procurement of supplies, personnel and equipment for the Greenland station.

Each day, more and more of the problem of procuring supplies, materiel and personnel was shifted from the Radiation laboratory onto the Navy and the Coast Guard. There was also the problem of equipment production.

Having had no experience in mass production, or indeed, any production of any sort to speak of the Radiation Laboratory had spread its contracts for transmitters, receivers, timers, etc. with fine abandon. To put it mildly, as the construction of the system chain progressed, the inability to obtain delivery of technical equipment was a constant drag on the effort to get the stations into operation. By the end of August Mr. Eastham assured Lt. Cowie acting NLOL after Captain Harding's departure on the 23rd that total number 51 receiving equipment could be expected finished and delivered to the Navy by 1 October 1942. This assurance was however no guarantee that they would be ready for actual sea service on or near that date as the contractors delivered many in entirely unusable condition.

Mr. Easham also assured Lt. Cowie that the Army had reported ordering 1250 airborne receivers from Philco and would probably order 2,000 in the near future. Since these figures were never confirmed, they show only the confusion existing in the relations between the Radiation Laboratory and the Army.

During September 1942, the USCG personnel who where to man the Greenland station began training at the Radiation Laboratory, the assembly of supplies progressed, and all preparations were made to move onto the site.

Baccaro and Deming were nearing completion and the Canadians took over operation, with the assistance of Radiation Laboratory technicians.

For the sake of maintaining proper sequence in this record, this chapter and the one following will treat primarily with the construction difficulties attendant upon the establishment of Bona Vista, Newfoundland and Battle Harbor, Labrador. More space is devoted to the building these stations, than to that of the first two Canadian units, because the first two units were the only ones followed through on by the Royal Canadian Navy in accordance with the original Radiation Laboratory plans and were practically no different then that construction of the two temporary stations in continental U.S. since they were inaccessible [sic] and inhabited parts of Nova Scotia.

By October 1942 the status regarding supplies, maintenance and personnel for the Newfoundland and Labrador units had undergone a drastic change. The Newfoundland Government had

confessed itself lacking in adequate personnel to man them and the Canadian Navy withdraw recommending that direct arrangements be made between the United States and Newfoundland. The poor showing of the local contractors on the two original Canadian stations, plus the civilian labor shortage farther North, made the necessity of the U.S. Navy's taking over all construction on the remaining stations of the obtain apparent.

For example, when Mr. McKenzie left Boston for Battle Harbor, Labrador on 27 October with 1,000 pounds of technical equipment he was under the impression that the construction of the buildings at both Battle Harbor and Bona Vista had been completed. His recollections of the next few months, however, paint a very different picture.

Arriving in Halifax, he received excellent cooperation from the local U.S. Navy's Lt. Malcolm Stanley, who had been advised by NLOL and how arranged his further passage under U.S Navy sponsorship. He left Halifax in a corvette, in a convoy. All the other ships turned back shortly after starting, due to extremely bad weather condition, but the corvette Mr. McKenzie was on maintained her course and after a very rough trip, he arrived in Battle Harbor, where his equipment was lightered ashore. Here, he found conditions very bad.

The station, which was supposedly complete, was without plumbing essential parts being unavailable to the local contractor. It was also without wiring, lights, provisions or cook. McKenzie had been selected for the Radiation Laboratory field service because he had a fair, though not to extensive, background in construction work so in spite of all these disadvantages, he managed to get the equipment installed and the station on the air by 15 November 1942 with the help of Lt Comdr. Argyle, RCNR.

However, in fairness to the contractor, it should be here recorded that in attempting to expedite the work at Battle Harbor, a Royal Canadian Air Force plane exploded in the bay on landing and the first group of lives were sacrificed in the hazardous and long field undertaking that made the final development of Loran possible. The contractor's superintendent was seriously injured in the crash, and was unable to carry on the work thereafter, further, the work was interrupted by spectacular submarine attacks rescues of survivors and searches near the station, all of which were participated in by Lt. Comdr. Argyle and the others.

Unfortunately, getting the station on the air by 15 November was not as good as it sounds. Throughout the entire process of establishing the system, the field men of the Radiation Laboratory, being primarily scientists, showed infinitely more interest in getting the equipment into experimental operation, than in seeing that the station themselves were fit for occupancy by a permanent crew and ready for reliable service.

Construction was also delayed at Bona Vista and Battle Harbor, due to the necessity for the U.S. Navy through the NLOL, to leap into the breach and without any forewarning try to supply the materials and supplies which were originally supposed to be supplied by the civilian contractors, the Canadian Navy or the Radiation Laboratory. Lt. Cowie carried most of this burden while Captain Harding was still in the Pacific.

By October 1942, then the status of establishment was scrambled to say the least. The Radiation Laboratory was still footing and bills and supplying the strictly Loran technical equipment for the stations. They were also supplying advisory technicians to install the equipment and get the stations on the air. The burden of supply and transportation had fallen on the U.S. Navy, with occasional help from any Army units within reach. Personnel were being drawn by now, at the direction of CNO, almost exclusively from the Coast Guard, and Radiomen and Technicians of the USCG were training at Cambridge to man the Bona Vista and Battle Harbor stations.

On 8 December 1942, Mr. McKenzie, with orders to return to Boston, was transported by the U.S. Navy to Argentia, where he received new orders to proceed at once to Bona Vista, Newfoundland, transported Mr. McKenzie with orders to return to Boston. There, he found conditions almost as bad as those at Battle harbor. No radio equipment had arrived at the site at that time, no barracks had been built, no plumbing had arrived and the well for the water supply was incomplete. The day after his arrival it blew a 90-100 mph gale.

Also at about this time, the first war loss of equipment bound for a Loran station occurred with torpedoing of a ship between Newfoundland and the mainland.

Radio Electrician, James Koonce, USCG with a Coast Guard crew to man the station and hundreds of tons of supplies arrived late in the year, almost two months behind schedule, having had a terrific struggle to reach the station at all. Taylor, who was on the site when McKenzie arrived, managed to keep the road open with the tractor, and the gear and equipment was brought in to the site overland before the snow set too deep. By dint of all hands turning to and keeping on the job until completion all equipment and supplies available were moved onto the site with the exception of some gas and oil which had to be left until a later date.

Food proved a major problem next to inadequate housing and practically no heat. Shortly after the Coast Guard crew arrived, over two-thirds of the entire personnel on the site came down with influenza, intestinal influenza and dysentery. Warrant Officer Koonce and Mr. McKenzie were also stricken and an impossible situation developed. The local doctors refused to leave the towns during the winter to treat anyone in isolated spots. Mr. Koonce appealed to the commanding officer of a U. S. Army unit stationed nearby and the doctor attached to that unit came to the site as often as possible and treated the men. During the rest of the time the half sick cared for the sick.

It was impossible to keep warm as there were not enough stoves and the buildings had been so poorly constructed that they leaked more cold that the inadequate stoves could overcome. The lack of plumbing was a most serious hazard, as it was highly dangerous for very sick men to leave the comparative warmth of their beds for, the zero and sub- zero weather outdoors.

As soon as he could get on his feet, Mr. Koonce appealed to the local contractor to do something, but the contractor professed himself unable to carry on any further construction until spring. In desperation, Mr. Koonce went to the Navy Construction Battalion plumbers who speedily installed a "token" plumbing system which nevertheless serve its purpose for the worst of the epidemic.

Illogically the local contractor then threatened to sue the Radiation Laboratory, because the plumbing work had not been left for him to do as was originally agreed. After an interview with Mr. McKenzie who was very ill, but not too ill to be also very angry, the contractor decided that a suit on such grounds would be unwise. Mr. McKenzie was probably the sickest member of the personnel at the site. Mr. Koonce managed to keep him alive by feeding him a mixture of half-baked bread, bullion cubes and whiskey.

There was no fresh food to be obtained and although Mr. Koonce made arrangements with the Army outfit nearby which was furnishing the doctor, to also furnish them with fresh food, for quite a long period there simply wasn't any and the Army too lived on field rations.

Another hardship for the crew though a psychological one was the absence of mail and communications. No mail was received by any of the men at the site for over four months and Mr. Koonce encountered numerous difficulties and establishing any type of communications.

In spite of all these mishaps and disasters, the station was on the air testing by February 1943. The testing developed into one of those comedies or error so frequent in any new operations.

After Mr. McKenzie had arrived in Bona Vista, the rate agreed upon for Battle Harbor was changed by Radiation Laboratory directive. Since Mr. Koonce had been unable to establish a mail or communications system with the outside by the time the unit was ready to go on the air, no one at the Unit #5 had received their copy of the new instruction. As a result Mr. McKenzie had quite an irritating time, blinking at Battle Harbor almost constantly as a signal that the operator there should put his signal back on the correct rate.

When he was positive that the technical part of the unit was operating correctly, sometime in March 1943 Mr. Mckenzie returned to Cambridge where he entered the hospital to recover from his illness of that winter. Mr. Koonce remained in Newfoundland in charge of the station for the U.S. Navy.

[Extracted from http://www.uscg.mil/history/STATIONS/LORAN_Section_3.asp]

(LORSTA Attu, May, 1945.)

SECTION III
CHAPTER 2

The establishment of a three-station chain, plus a monitor station in the Bering Sea, is a good example of the other side of the picture. The seven-unit system on the Atlantic demonstrated the confusion resulting from "too many cooks in the kitchen." While a certain amount of confusion is bound to result when attempting the establishment of any station or outpost in the Bering Sea area, due to the extreme climatic conditions, the speed and dispatch with which the first four Alaskan units were put into operation is a tribute to the coordinated efforts of the Coast Guard, the Navy and the Army.

It is perfectly obvious from the start why all three services would necessarily participate in such a project. The U.S. Coast Guard was by this time possessed of full responsibility for the operation and maintenance of all Loran units under the jurisdiction of the United States. The Navy, however, was the prime user of Loran at sea, and the service most interested in obtaining speedy service from it. The Army had not only been in possession of the various points in the Alaskan and Bering Sea Area which they had wrested from the Japanese, but had to remain in some force in that area to maintain these outposts. Therefore the Army would often be the neighbors of the U.S. Coast Guard units. Interference with their communications systems already established had to be avoided at all costs. In addition, the army already had near several sites, much of the heavy construction equipment necessary in the construction of the units and by borrowing this from the Army, the Navy and Coast Guard could avoid transporting such equipment into the area, where transportation is a major problem.

Practically all air transportation during construction was by courtesy of the Army. In fact, the liaison between the various services was so excellent that within five months from the issuance of the Navy directive, some of the units were on the air. An excellent example of interservice cooperation will be found in excerpts quoted from Lt. J. F. Martin's reports, later in this chapter.

As soon as the Navy directive calling for the establishment of the first three Loran units in the Bering Sea area was received by the United States Coast Guard activity began to assemble construction equipment, supplies, etc., in Seattle for early shipment of the sites.

These first sites were located on St. Paul Island, St. Matthew Island, Umnak Island, and a monitor to be established at Cape Sarichef. The code names given these units in the order listed above were: peter, mike, uncle, yoke.

Since the locations for a number of the proposed Aleutian Station were in the forward and remote areas, and also because of the unsatisfactory progress made by the employment of civilian contractors for general construction work it was necessary and obviously most practicable to organize a special construction detachment to perform this work. A group was

formed of selected enlisted men and officer personnel who were qualified by their pursuits for the many types of construction work required.

Five civil engineer officers were assigned by the Chief, Civil Engineering Division for duty with CG Unit 26 (Condet Able) which was to undertake the construction of the Aleutian and Bering Sea Chain of stations.

Lt. James Cournow, USCG, was placed in charge of procurement of all material and equipment at Headquarters, under Capt. Gill and Admiral Johnson and Lt. J. F. Martin, USCG, was designated as Commanding Officer, Coast Guard construction Detachment and made his early operating base Seattle and later Dutch Harbor.

Shipment of material equipment was begun in February 1943 to the West Coast. Commanding Officers for construction and operations were selected and departed for Seattle also in February.

Throughout the month of March and early April all cargo designated for the projected units was assembled, checked and prepared for further shipment. Much of the construction equipment and tools was obtained from the Seabee advance base stock already in California. The Army contributed some special foods and clothing that is logistic experts had already developed for life on the northern islands.

On 12 April loading was begun and the liberty ship which carried the first cargo of equipment, the USS JONATHAN HARRINGTON, with about 100 Coast Guard construction and technical personnel on board, sailed shortly thereafter.

According to the account given by Lt. J. G. Permar, Civil Engineering Div., USCG, who sailed with her in charge of construction for Mike, they had an eventful trip. En route to Kodiak, the vessel had a submarine alert, which after all hands standing battle stations turned out to be a whale. The ship stopped at Kodiak to unload some cargo and the Coast Guard personnel had two days liberty ashore there. Then on Easter Sunday, 25 April the reached Dutch Harbor, where unloading began at once. The unloading was concluded within two days.

The CGC CLOVER had been assigned to assist in transporting the cargo on the sites and the cargo was transshipped onto her with all speed. Then bad weather set in and the CLOVER did not sail until early May.

Expediency has its virtues as shown in the following excerpt from Lt. Martin’s report of 19 May 1943:

"On 16 May the cutter CLOVER sailed for site P-3 (Mike.) At this time she was towing the small tank landing barge (borrowed.) When about 12 miles at sea the barge was capsized owing the excessive towing speed, which was ten knots. Efforts were made to right the barge at sea, but owing to conditions (climatic), this could not be done, and upon orders of the writer it was towed back into the harbor and beached. With the use of a large tractor it was righted and work was commenced immediately to tear down and clean the engines. This work is progressing favorably and it is estimated the barge will again be ready for use about 24 May.

"With the idea of getting work started, the CLOVER was ordered to sail for site P-1 (Peter) which she did at 0900 17 May. She arrived there at 1023 18 May and work of unloading was started immediately. A dispatch has just been received stating that his work was completed, and she is returning for the second and final load of supplies. With the assistance of the Army detachment on the island a road has been started from the landing along the bluff on south side of island to site. There are about 300 men (Army) with considerable mechanical equipment in this detachment and full cooperation is being given. Coast Guard construction personnel to the number of thirty were taken on the first trip and these men are remaining on the job under the direction Ensigns Permar and O'Meara."

Thus it happened that Ensigns Permar and O'Meara who were originally destined to handle construction on St. Matthew, ended up by building the unit on St. Paul instead with a saving of time and effort on the part of all concerned.

The cooperation of the Army detachment mentioned above is also representative of all the detachments stationed anywhere near Loran sites in the entire area.

Ens. Permar stated that another reason for diverting the original construction unit from Mike to Peter was that following the capsizing of the barge; a wire was sent the Army at St. Paul requesting the use of a lighter. The Army replied that they could supply one for unloading there and with the aid of the Army the CLOVER was unloaded within twenty-four hours after arrival at Peter. The unloading point on this island was near a native village, which had just returned to their homes in the village a few days before the arrival of the CLOVER. They seemed very glad to see the Coast Guard arrive greeting them as old friends and expressing pleasure that a station would be on their island.

The materials at Peter were trucked for five miles over a road, then moved the last three miles to the site in borrowed Army tractors and track type trailers. The construction camp was set up at the three-mile point where the Coast Guard personnel lived in tents, using an abandoned fox trapper's shack as galley.

All land for the first three sites had to be obtained from the Secretary of the Interior, by the Secretary of the Navy, as the sites were situation on either grazing rights or wildlife sanctuaries. Silver and blue fox, reindeer, and Kodiak bear populated the island and one unit required telephone repairs rather often as the reindeer persisted in knocking down the wires with their antlers. The use of the sites by the Coast Guard was granted for the duration and six months thereafter.

The construction and installation of this particular unit proceeded with no undue hardship on the part of the Coast Guard crew. The main difficulty was encountered by the CLOVER, which found it difficult at time to maintain regular unloading schedules at all the sites as the weather was always so uncertain in that region that of ten she had to stand off for fog, and Peter, Uncle, and Yoke had their share also. Within ten minutes so variable was the weather; the same spot would experience bright sunshine, rain, then snow, and then fog.

It seems unnecessary to cover in detail the construction of each separate site in this chain as construction proceeded almost simultaneously at all four points, and difficulties encountered at one would probably be duplicated at some time at all of them.

It was necessary at all four of the sites to remove the layer of muskeg before building, as the muskeg was so spongy that no permanent erection could be anchored to it. This was done with heavy Army "cats" and tractors. Special precautions had to be taken in the erection of the antennae, as the winds there are forceful and special guying was advisable. Often in the water supply proved a problem, which in some cases was overcome by chlorination of the local supply or in others by the use of evaporating units.

Unlike the situation of the men construction the original Atlantic Loran system, the Coast Guard personnel in the North Pacific area suffered no shortage of food, medical supplies, necessary construction supplies, etc., due to the excellent combined logistics of the various Services participating in the program. Their buildings were weather tight, their clothing was correct and adequate; they did not have to await the pleasure of civilian contractors for the installation of their plumbing, and health and morale were reported as uniformly good. On 4 July 1943 the Coast Guard crew stationed at Peter played the Army construction outfit at softball. Army won.

It is a tribute to excellent personnel work on the part of both the Army and Coast Guard officers stationed on these islands that the personnel maintained such harmonious relations, especially since the Coast Guard mess equipment and sometimes pay exceeded that of the Army.

While the Army, as has been shown, gave all possible construction aid, more difficulty was encountered on some of the other islands in landing supplies and equipment than at St. Paul. In some cases, the harborage was nil, in other williwaw conditions prevailed and in others the site was extremely difficult to reach from the landing point. However, all things considered there was a minimum of friction delay and discomfort.

Credit should be given the Commanding Officers and Construction Officers of the U. S. Coast Guard who drew this first all-service assignment for their tact resourcefulness and efficiency.

The original officers for the first three units established and the monitor were as follows:

St Paul - "Peter"

Construction - Ens. Permar
Commanding Officer - Ens Albert J. Preston

St. Matthew - "Mike"

Construction - Lt. (jg) Horder
Commanding Officer - Ens. Barwick

Umnak - "Uncle"

Construction - Ens, J. J. O'Meara
Commanding Officer - Ens. Drouin

Cape Sarichef - "Yoke"

Construction & Commanding Officer - Guy Bellinger, CRM

During the construction period, all personnel were under the jurisdiction of the Officer in Charge of Construction Detachment, USCG, Lt. Martin at Dutch Harbor, Alaska. When test operations began the operating officers and crews came under the jurisdiction of Lt. Comdr. Amos, USCG.

It should be noted here, though without undue emphasis that the original Commanding Officer of Uncle was considered unqualified, before construction began, by Lt. Martin and Headquarters was so informed. He was shortly replaced for this duty by Ens. Drauin who carried out the major part of the installation of technical equipment and put the unit on the air. Mention is made of this situation only for the reason that it emphasizes the necessity for careful selection Personnel for all such specialized assignments as much time and effort can be lost when such care is neglected at the start.

Ens. O'Meara did not remain long at Peter, but proceeded to Umnak as soon as weather permitted and carried out construction operations there. By July 15 1943 Peter was ready to go on the air test and Ens. Permar departed on that date on the CLOVER to Dutch Harbor. Here he picked up a load for Uncle and upon reaching there remained supervising construction for about a month until the unit was ready to go on the air.

With the order to construct these units, the decision was also reached by the Navy to relieve NDRC of the onus of equipment production. This was effected early in 1943 and technical equipment thereafter for all Loran units was obtained through BUSHIPS. With this move, the last connection between NDRC and the establishment of Loran units was beginning to be severed as Mr. Fletcher Watson formerly Secretary for NDRC and an accomplished astronomer, accepted a commission in the U.S. Navy and as Lt. Watson of Hydrographic covered the charting job.

It is of interest to note so poorly had the Bering Sea Islands been shown on all available charts, that when the Loran Units went on the air testing there true fixes proved the location of the various islands on existing charts to be as much as several miles in some cases, out of position. For that reason Hydrographic Office, USN has found it necessary to Loran re-chart practically the entire area.

In July, 1943 a site survey party covered the Aleutian Islands and selected sites for three more units of Loran at Amchitka, Attu and Adak, as Dutch Harbor was considered too far away for efficient correlation of activity.

It is not good historic practice to record the good and omit the bad when giving a true record and therefore it must be admitted that although conditions and delays were much worse in the Atlantic chain, the Pacific chains were costly in loss of life. Although Mike had been listed as

expendable it was not believed that any of the losses of personnel in the Pacific area were due to enemy action though there is some doubt in one case.

During the testing period of the units, five enlisted men were lost. Mystery still enshrouds the loss of these men who set out from Mike in a small boat for a shore shoreline trip to an Army weather stations some nine miles away. Ensign E.T. Barwick, USCG, C.O. at Mike reports as follows:

"At 1500, 20 September 1943 boat crew consisting of HAGLUND, Floyd O. (220-806) RM1c, BREIMO, Elmer O. (538-953) Cox. (r), HAGEN, Edward C. (584-147) RM3, SCHMOLL, Kenneth H. (506-786) RM3 (r), and MACLAND, Thomas L. (636-878) Sea. 1c (r), departed from this station.....the boat crew's orders were to pick up a small gasoline engine generator formerly used by Army weatherman in transmitting weather reports to St. Paul Army Garrison."

The men, boat, and all equipment in the boat disappeared without a trace. Searching parties were sent out along the shore to the destination of the boat's crew and search was also made along the beach and by boat. At 1338, 24 September, a PBY dispatched from Adak joined the search but to no avail. Two other paragraphs from Ens. Barwick's report may or may not be significant. However they are worth quoting in absences of any conclusion proof of the exact fate of the men:

"There is slight evidence that the members of the boat crew might have met with enemy action been taken prisoners." And...."As yet there is no evidence such as floating oars, lifejackets, pieces of wearing apparel or boat having washed ashore." "YP 197 advised at 1400, 28 September 1943 there their searching party had found a 5-gallon oil can floating between Pinnacle Rick and this unit, which was later identified as fuel can used in surf boat in which boat crew departed." Also strange human footprints were found at this time on this uninhabited island.

In addition, these paragraphs to make the mystery more complete:

"In making trip to the Army site via water it is unnecessary to navigate more that 200 yards off shore at any time and men were under orders to keep within this limit, as the writer made the trip several times with Haglund and Breimo instructing them which course to pursue."

"At the time the boat crew departed, the sea was calm and no difficulties were encountered when launching boat through the surf."

Unlike earlier Loran construction parties, ConDet "A" arrived at the Western end of the Aleutian Islands during the latter part o 1943 with an outfit that the Japanese may have had in mind when they complained of the "Unsportsmanlike conduct of the war by of vulgar display of wealth." However, the job was being undertaken at the worst time of year in order to make Loran in dire need of such service in the western Aleutians.

This auspicious beginning, however was literally "the calm before" so many storms that the Aleutian construction detachment began to think they had been assigned to "Hell's Corner".

Men and materials began to arrive at sites 62 (Adak) [sic], 63 (Amchitka) and 64 (Attu), beginning in early November 1943. Liberty ships and the Coast Guard cutter CITRUS did the transporting. The Liberty ship GEORGE FLAVEL left Seattle 24 October and arrived at Adak 18 November. The Liberty ship McKENZIE with material and some personnel aboard arrived at Attu on 3 December after stopping at Adak and Amchitka on the way.

Since the Aleutian Islands are conceded to produce some of the world's worst weather and since the coastline in that area consists mainly of mountainous jagged rocks standing on end, swept by violent tides, currents and monumental surf all landings were "by the grace of god" and extremely hazardous and precarious. Attu undoubtedly presented the largest and most varied collection of climatic and physical difficulties of the three Aleutian sites, so that a detailed description of the construction there will encompass all hazards encountered in the entire Aleutian operation.

According to Lt. Comdr. Russel Yates, USCG, C.O. ConDet "A" the lack of warehouse space and spare huts on Attu on arrival was acute. The Coast Guard construction crew was immediately forced to erect three Quonset huts for storage space at Massacre Bay, with material furnished by the Sea Bees there.

Then the first section of the construction party left for site 62. they established a temporary construction base camp at Baxter Cove, since the site survey party had selected this spot as the only place anywhere near #62 where landing might be possible.

Wooden barges brought to Attu, to be used in unloading operations "were found unsuitable for this location", a mild way of stating that they were smashed to matchsticks on the rocks in the surf. Those left were traded for a 5x7 steel pontoon type barge with removable sections, which is being extensively used by all armed forces in landing operations. These pontoon barges, or "Admiral Laycock's cigar-boxes", are the only type of equipment which can withstand such a shoreline, since two-thirds of the section can be punctured on rocks and they will still retain their buoyancy.

Tents, mess hut and Loran transmitting equipment storage hut were erected during the usual foul weather and the ubiquitous "Cat" was started on the construction of the two and half mile road to the site.

Lt. Cmdr. Yates gave the high points of this killing two and a half miles in a few succinct paragraphs when he said:

"The first five hundred feet of the road took us through an Aleutian cemetery located under a dummy gun emplacement that the Japs had abandoned a few months before. Desecrating an Aleut grave is a serious offense, but we were unaware of it until we started turning up human skulls and bones of prehistoric animals which had been in turn, buried deep below ivory trinkets and tons of bird and fish bones.

"Another midway tent was erected a mile and half from Baxter Cove to serve as a mess hut and shelter during round the clock work on the road."

"After consultation with the aerologer, it was decided to unload a large portion of the building materials on 24 December. And other 5x7 steel pontoon barge was borrowed from the CB's and in company of the CITRUS, both barges arrived off Baxter Cove shortly after noon of that day. A heavy ground swell made unloading from the cutter to the barge precarious and the unloading was further delayed by increasing swells and a weather report that a sudden squall was headed our way."

In spite of conditions becoming rapidly adverse, both barges made the beach about sundown and temporary floodlights were rigged. Unloading operations continues all Christmas Eve and until noon on Christmas Day. By then, heavy seas were tossing the barges around on the rocks men were escaping death by a hair every other minute in an effort to complete the unloading and the confusion that existed was like 'midshipmen on watch.'

"The storm increased in intensity and the CITRUS was unable to maintain her anchorage, (there is very little good anchoring bottom in the Aleutian area), and was forced to return to Massacre Bay for shelter. All hands ashore, which included some of the CITRUS' crew, remained there until the storm subsided, 2 January."

Most of the materials were carried to the site from Baxter Cove on a barge sled, made by the crew and pulled by the "Cat". The road was formally christened Hooligan Highway and when completed was quite on of the engineering wonders of Attu.

The antenna poles were rafted and towed to Baxter Cove, then hauled over Hooligan Highway by the "cat" to the site. Because of the sharp turns in the road, a switchback donkey winch had to be employed. Throughout all operations winds sometimes reaching velocity of 125mph raged and snow twelve feet in depth paralyzed vehicular traffic for days. Only the power line survived the storms and the days were filled with the struggle t push construction and at the same time repair constant storm and wind ravages.

Site 62 was out of touch with Massacre Bay for five days in early February. During that time the crew erected several 90' antenna poles in ideal calm weather. It was later learned that the Massacre Bay area only fifteen miles away had been swept by a five day storm with 125mph winds. Mail had to be dropped at the site from a plane as landings at site could only be made during the best of weather, which was so seldom it would furnish food for conversation for day afterwards.

The armed services paid dearly in loss of lives for tenure of the Aleutian Island. In the same storm which struck Massacre Bay, nine men were lost on an ATS tug which went down only two hundred feet from the Army dock with the help unable to reach them from the shore. In all the Army lost approximately fifty men during January and February of 1944 in landslides and to the sea.

At Attu, the Coast Guard was frequently called upon by the Navy COP to assist in rescues and salvage work. The CITRUS took nine men off a swamped ATS tug without loss of life and then sank the dying tug with gunfire. She also assisted in getting the Liberty ship off the beach where it had been driven in a severe storm. The members of the Coast Guard construction crew at site

62 removed nine more Army men from a battered ATS power barge and received a commendation for their gallantry from the Commanding General of the Area. Such rescue and salvage work could have become an all-time job for the personnel for the Coast Guard in the vicinity, if they could have spared the time from their regular duties as in addition to the fiendish weather, the harbor at Attu was very poor with little shelter and a bad "holding" bottom.

Site 62 was located on a saddle of the hills, at an elevation of twelve hundred feet. It required the use of bulldozers to reach it with materials and the employment of switch backs due to the terrain and steepness of the slopes. William A. Baughman, Sea. 1c was killed on the stitch back when the "cat" slipped out of gear and rolled over him on its steep descent to the edge of the bluff.

The Coast Guard paid for Aleutian Chain with other lives too. Ensign Johnson, C.O. of unit 64 was killed when the PBY he was in crashed making a landing in Dutch Harbor. He was engaged in running baselines when it happened. Another plane a Coast Guard PBY with its entire crew was lost without trace, near Point Heiden, while returning to the States.

With all these misfortunes and all nature leagued against them the Construction crews in the Aleutians did a magnificent job and in an amazingly short time. Three months after the landing at Baxter Cove the construction crew were gradually beginning to be returned to the states. The last man left the Aleutians about 15 March 1944 and the regular operational crews took over. After extensive testing operations all three stations were commissioned 18 May 1944 and turned over to the jurisdiction of the Aleutian Representative at Adak, Lt. Bob Kersten.

The great significance of the construction feat in the Aleutians lies obviously in the fact that in spite of the most adverse conditions the Coast Guard working with the cooperation of the other armed services can erect short lengths of time. A tribute indeed to splendid organization and the staunch determination of the personnel engaged worthy of the tradition of the United States Coast Guard at its best.