Beginning in 1946 and continuing through the sixties, tuberculous Inuit were evacuated from the Canadian Arctic to large sanatoria in the south – mainly at Edmonton and Hamilton.

The following is excerpted from a book-length study of the evacuations from the Eastern Arctic (present day Nunavut and Nunavik) to Hamilton. Records held at the archives of Hamilton Health Sciences (the successor to the Hamilton Mountain Sanatorium) and at Library and Archives Canada, as well as the recollections and memorabilia of nurses and other participants in the events, have been drawn upon to produce an account of this moment in the relations of aboriginal and Euro-Canadian peoples largely from the Euro-Canadian perspective.

THE PICKER PORTABLE GOES NORTH

One of the things that particularly bothered the prime minister was the apparent incapacity of the government to act effectively as the "Canadian owner" of our northern territory. –Gordon Robertson[1]

I can now express the fundamental difference between the ancients and the moderns in political terms. The ancients construct tools as a defense against nature; the moderns subscribe to the thesis that the best defense is a powerful offense. - Stanley Rosen[2]

Knowledge is power, but if it is to augment the political power, it must be exercised over physical and social distance, and in the case of medical knowledge, the skills, drugs and instruments arising from new knowledge must be sent into all parts of the territory. England was able to grasp Hudson Bay by means of the Company and the Company's aboriginal trading partners, who attended at a string of seaboard posts. It was largely by piggybacking on those long supply lines that Canadian statesmen, after the cession of Rupert's Land and then the arctic archipelago to the new state, were

1Gordon Robertson, *A Very Civil Servant*

2 Stanley Rosen, *Metaphysics in Ordinary Language*, 116

able to reach across the distance between the capital and the people over whose land they wished to become sovereign—a wish which the Canadian state itself lacked means to realize. Pending the necessary technological developments, and accumulation of the wealth to pay for them, an annual shipborne Arctic Patrol was the state's instrument to inventory its putative domain and assert its right. Up to 1950 this patrol was conducted mainly from chartered vessels. (The exception was the *Arctic*, originally built for a German Antarctic expedition and purchased by the Canadian government in 1904.) Gradually, assisted by the enlargement of the state's capacities during the European and Pacific wars, the lineaments of power became equal to the pretensions of the politicians. The capacity to build true icebreakers, the proliferation of aircraft of all sizes, as well as the reduction to practice of the long sought helicopter, and the advent of satellite or micro-wave relay towers to assist communications, allowed the dream to become practicable; the decision of the American rulers to maintain the centrality of military spending in the U.S. economy forced it to be realized. A very wild ride ensued. The logic of territorial competition and technological change entailed first the rapid completion of Canadian colonization of the arctic, and then almost immediately, like a wound-up spring uncoiling, the nominal re-assignment of authority to its rightful holders and the relinquishing of the undeclared colony to its proper owners, all within a single generation.

For twenty years (1950-1969) the flagship of Canadian aspiration in the Eastern Arctic was the Department of Transport vessel *C.D. Howe.* The *Howe* went every summer up the coast of Labrador, around the Ungava peninsula and then down along the east coast of Hudson's Bay, across to Churchill, and then finally north to Baffin Island and higher latitudes.

The *Howe* replaced the *Nascopie,* a Hudson's Bay Company vessel which, crewed by Newfoundlanders under Captain T.F. Smellie had supplied the company's Eastern posts for the previous thirty years. In the words of a Southern medical emissary, the Toronto surgeon Dennis Jordan, the voyages were through "uncharted waters...when radio was in its infancy, radar unknown, airplane travel hardly begun; when the successful annual voyage of this ship was the one yearly contact of the Eastern Arctic with the outside world, and when the failure of the ship to get through meant privation and hardship to both Eskimos and white men."[3]

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3 Dennis Jordan, in Roland Wild, *Arctic Command*, viii

Nascopie's replacement for EAP purposes was a brand-new "ice-strengthened" vessel designed by German and Milne of Montreal, and built by Davie shipbuilding at Luzon near Quebec City. The *Howe*, an instrument of new policies, was owned and operated not by the HBC, to whom the Canadian government and the medical and scientific communities had been beholden until then, but by the Department of Transport. (After 1962, the Coast Guard.) The ship entered government service in 1950 and continued as the Medical Patrol vessel until 1969.

Awaiting medical examination on the C.D. Howe, 1958. McMaster Health Sciences Archive, Johanna Rabinowtiz Collection.

I want to consider the ship and its equipment in their role as the "tools of Empire" (Headrick) – that is, as an important means by which Canadian administrators consolidated and exercised their authority over the hinterland which had become a focus in the global balance of military preparedness. The mobilization of non-military science, technology and medicine and its delivery into the North by way of the Howe and other supply and research ships, *is* the politics of this period.

The core of the medical enterprise carried into the North by the *Howe* was its X-ray capacity. This enabled the rapid diagnosis and therefore speedy evacuation on which the whole TB eradication programme depended; and on the reduction of TB and other infectious diseases depended all other plans for rearranging the lives of northerners.

The train of developments which unfolded over a century and a half and led to the equipment eventually supplied by Picker X-ray of Cleveland, incidentally yielding the incandescent lamp and the process of fastening metals by welding along the way, was initiated by Davy. Around 1800 he showed a long-lived, arch-shaped spark at a gap between two pieces of charcoal connected to a source of electricity. All parts of this apparatus – the rods, the generator and the spark, underwent many changes before eventuating in the appliances familiar to us.[4]

The crux of the inventor's problem was the intensity of events at the gap. The rods were more or less rapidly consumed at their tips, thus altering the gap and therefore the quality of the spark. Mechanisms for maintaining the preferred gap by advancing the rods were devised, and means of making this process self-regulating. But the light was painfully bright, and could not be throttled. Glass enclosure and substitute elements finally produced (1907) the tungsten filament in an evacuated bulb, which we are currently being urged to abandon in favour of something more efficient.

Crookes' gas tube was a simple device – a slight variation on Davy's spark-gap, in fact. But concealed within it was a manifold that budded very profusely indeed. Crookes turned to the tube while seeking the solution to a problem of measurement. He had noticed that his platinum scale read differently in bright daylight than in dim. So what might be the "weight" of light? His first response to this question was a small evacuated globe of glass, containing black and white vanes. This gadget, which we call a radiometer, is still widely available in shops that deal in fossils and chemistry kits, and serves well to illustrate the intermingling of theory and technique. Getting that tiny weathervane-like gizmo into the globe was tricky, so Crookes decided to substitute for his radiometer a device easier to build: a glass

4 Elliott *Technics and Architecture* 246ff

tube with electrical wires running to it, somewhat like the one built by the German Johan Hittorf in 1869. In Hittorf's version, whatever passed between the positive and the negative wire-ends was allowed to bounce off the glass wall of the tube, at which point it caused the glass to fluoresce. (Crookes' device, a variant on the tubes of Hittorf and Lenard, was subsequently used to show that whatever was crossing that gap was both a particle and a wave.) Meanwhile, Konrad Roentgen, an older colleague of Lenard, noticed something peculiar: while he was using one of these tubes to investigate the cathodic discharge – what we term electricity – he discovered a new species of ray, which he labelled X for unknown. To eliminate distraction, he had enclosed the tube in black cardboard. This allowed his eye to become sufficiently dark-adapted that he was able to detect an oddly misplaced glow. Some nearby paper marked with an aleph scrawled in a developer appeared to fluoresce in sympathy with the tube. The cardboard was effectively transparent to whatever was being emitted by it. He went on to check the transparency of a few other materials, including his own flesh and that of his wife, wrote up his observations, and on January 1, 1896, after seven weeks of investigation, mailed them to scientists in England, France, Germany, and Austria. The tube produced a light-like energy, "A New Kind of Ray", as Roentgen titled his report on his findings. A Viennese newspaper, alerted at third hand, ran a story and some of the photographs which Roentgen had included in his mailing. Sensation.

An enormous boom of experiment and innovation followed. Development of the new technology was complicated and competitive as the very many practitioners brought into the field by commercial hopes were working intellectually blind – that is to say, in the early days practical results preceded scientific understanding of why they occurred. Edison hustled an improved fluoroscope. The Italian army X-rayed casualties in field hospitals in Abyssinia.[5] Lawyers brought X-ray pictures into the courts. However, there were a few problems with the apparatus and the procedures. Some had to do with the quality of the images obtained, some with limitations of the process, which allowed no viewing of soft tissues, and some had to do with the nasty effect of the rays on frequent users.

5 Bettyann Holtzman Kevles, *Naked to the Bone* , 39

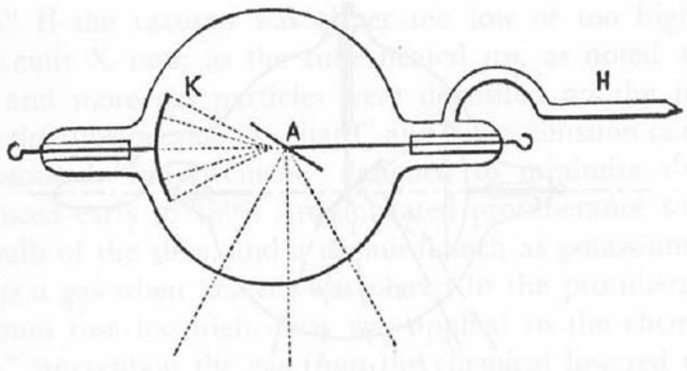

FIG. 11. From *Electrical World, 27:* 377, April 4, 1896.

The individuals who taught themselves how to manipulate the new rays were working at close quarters with potent and dangerous forces. Not only was X-radiation hazardous for its ionizing effects, but also the electrical currents used to produce it are themselves dangerous for the heat, light and convulsive effects produced when the operator becomes their conduit. These can include interruption of the heartbeat. In early days, the electrical perils masked those of the rays. Later, when these harms had been recognized and the radiation was strictly contained and carefully aimed, and all involved were well shielded, the risk of serious electrical shock remained and even increased along with the scale of the power supply. However, good insulation and good isolation of electrical equipment transferred the risks from medical personnel to service technicians

Ionizing radiation, as distinct from radiation which is merely energizing, is defined by the results of its encounter with water. Water is used as the base of comparison because it makes up a large part of most organisms. Radiation energetic enough to remove an electron from a water molecule is deemed ionizing. Left behind after this encounter is a hydrogen – oxygen pair and a solitary hydrogen. These may proceed to further reactions with other molecules. The wildly caroming electron meanwhile goes on to engender a cascade of similar events. But also, the X-rays strike materials other than water, which can be variously altered. Among the others is the genetic material. Since those particular molecules are the instruction set for the manufacture of others, a change to their structure garbles the instructions, ultimately causing the production of a cancer or perhaps a fetal defect.

X-ray progress was possible despite the initial lack of understanding because the problems were problems of materials and mechanics, and this continued to be the case after 1912, when it was shown that X was a form of electro-magnetic radiation, like light.

The physics is beyond our concern, not to mention my capacity. A compact exposition for the innumerate is Richard Feynman, QED, but the procedure of diagnostic X-radiation may usefully be considered as a sequence of generation, direction, irradiation of a subject, registration, and interpretation. The parts of this sequence are also reciprocals, so that, for example, the greater the sensitivity of the registrant, the shorter the session, and so the safer for the patient, and the greater the number of patients who can be seen in a given time. It is by thinking about the steps in this sequence that problems are defined and selected for investigation.

Quite soon it was realized that as air is much less opaque than water, the X-ray shadows of the chest would show more helpful contrast than those of other regions. It also became evident that a chest X-ray could reveal the presence of tuberculosis before any of the usual outward signs appeared. Early detection promised earlier and therefore more successful treatment, but the inference to mass screening by X-ray did not come into practice until the First World War. Large numbers of men presenting themselves for induction in Canada, the U.K. and the U.S. and subsequently for treatment in the rear of the French killing grounds, were examined by X-ray. But the apparatus was not standardized and capable radiologists were few.

> It is hard to believe that a man's sternum could have been divided in an attempt to find and remove a bullet that was lodged almost superficially in the back of the side of one of the dorsal vertebrae. Cases such as this –perhaps not so bad—were not at all infrequent and became common knowledge among the staffs of the hospitals at home. They were obviously due to an insufficiency of men who knew even the rudiments of radiology.[6]

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6 A.E. Barclay, The Old Order Changes, *British Journal of Radiology*, V. XXII, No. 258 (1945)

It also emerged that the health of recruits was not very good. Thirty-five percent of the Canadians who volunteered were rejected or later found unfit in some way. There was a great deal of tuberculosis, although it was not easy to distinguish between it and other respiratory diseases which were also common. Interest in X-ray assisted diagnosis was high, and just at this point the equipment became much more practicable with the invention, by William Coolidge, of the high vacuum, hot cathode, tungsten target tube. Working for the General Electric Research Laboratory, Coolidge developed around 1910 a process for producing ductile tungsten for use as electric lamp filament. This metal had a very helpful application in X-ray too, where anodes had to this point been of platinum, which effectively tied usable voltage to the melting point of that metal – 1755 degrees. That of tungsten was 3000, almost double. Further the electrons which struck the target to yield X-rays in the collision were no longer provided by residual and quantitatively fluctuating gases in the tube, but directly from the cathode, which was heated in a fully evacuated tube until it emitted the desired particles. Immediately this new tube was incorporated into a portable field unit built for the American Expeditionary Force. In 1920 the tube and a transformer were placed together in an oil-filled and therefore well-insulated box. Voltage was not stepped until immediately before the tube, which made it easier to avoid electric shock. Ten years later the Phillips Company introduced the rotating anode. With this device, the collision site at which X-radiation was generated became a spot on a moving surface, thus reducing heat build-up at that point. The final great innovation of the interwar period was the Bucky-Potter grid, developed and refined by these two respectively, and which followed from the perception that the first X-yielding collision was far from the last. After passing from the tube and entering the subject, the X-photon triggers a cascade of similar events, knocking an electron from its associated atom and causing at the same time X-emission, which electron and X photon in turn reproduce the effect. The resulting radiation, leaving the subject at all angles, impinges on the registrant as well and causes blurring of the image. Scattered radiation was very important, as it was of an intensity 4 to 10 times that of the focal radiation. The remedy was to place a barrier between the subject and the register which would block the scatter. This "grid" – actually a set of parallel strips of metal – was devised by Bucky, made to move in place by Bucky and Potter, and marketed by General Electric from 1921.[7]

Two other innovations were important for the mass survey efforts which we are about to consider.

7 Ruth Brecher and Edward M. Brecher *The Rays: a History of Radiology in the United States and Canada* 206 - 208

These were the phototimer, a device which automated exposure time by converting X-radiation detected beyond the film into a quantity of light, which in turn was used to generate electricity, which was amplified, stored, and finally discharged to trip an off switch. The phototimer facilitated mass surveys by economizing on manpower and time, as the calculation of exposure was automated and disappeared from the radiologist's list of tasks. Cellulose-nitrate film stock had come into temporary use during World War I but glass plates were preferred because the film was essentially explosive and also produced a poison gas when burnt. Much better cellulose acetate film, coated both sides and sandwiched between fluorescing intensifier screens in a cassette became the standard register. (In the early fifties a Polaroid version was developed.) These film sheets were of varying sizes, the usual being 11 by 17 inches for a large region like the chest. Mobile sets however might use much smaller roll film, with a 35 or 70 mm. frame. By the mid-forties, the evolution of X-ray technique had suggested the following logic to anti-TB combatants.

Since the rest cure was the only demonstrated treatment for TB – and even most thoracic surgery in TB was based on the same principle, that of securing "rest" for the lung – and since the more "active" the case, the more contagious, it followed that early detection would help with both considerations: the earlier the burden on the patient was lightened, the better the chance of recovery, and the sooner he or she was removed from close contact with others, the less the chance of transmitting the bacillus. Hence, the safer and stabler the X devices became, the more readable the image, the more numerous the trained personnel and the shorter the exposure time required – bearing in mind that the lung, with its high contrast between air and tissue, is a "natural" for X-ray examination, the more realistic became the hope of scanning every greater numbers in ever shorter periods, and even a good fraction of the population. The final calculus then was a) the comparison of the cost of case-finding by radiography versus that by other means, and that of treatment after the disease has sufficiently expressed itself to cause the sufferer to themselves seek help, and b) the acuity of X-ray technique compared to other clinical methods of detecting the disease. The results of the calculus in this country were provided in the *Canadian Journal of Public Health* in 1955, in the form of a table of "Case-finding Activities in Canada, 1944 to 1953." In 1944 mass surveys screened about four hundred thousand persons. Thereafter the trend is always up, until by 1953, two and a quarter million people are seen, with another six hundred thousand passing through clinics. [8]

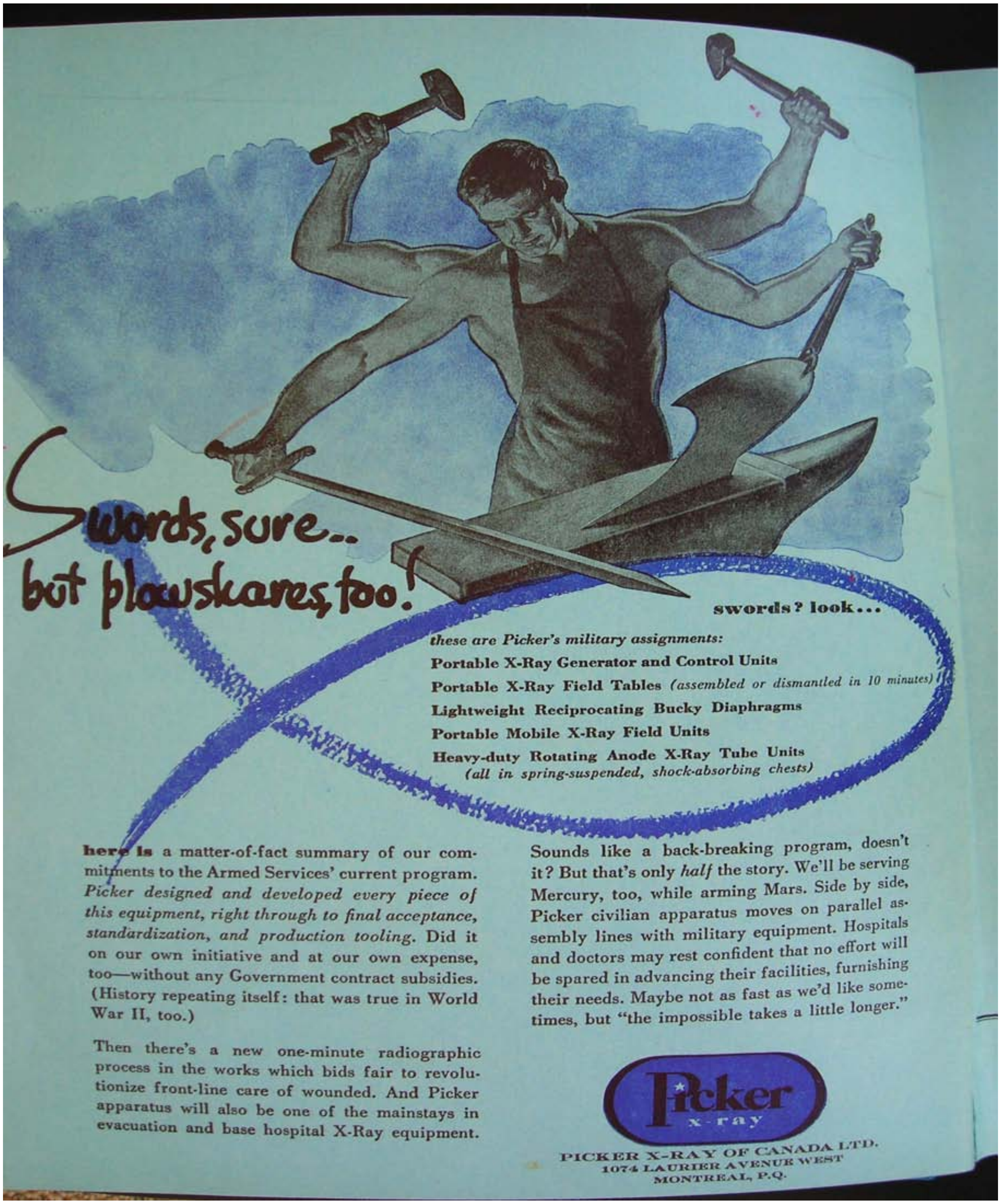
8 Wherett, CJPH 46, March 1955, reproduced in McCuaig, Appendix Three.

Even before 1944 there was a great deal of activity. The troops were X-rayed from 1939, and war workers as well. Another few years, and the procedure was ubiquitous. Many companies had an X-ray done of all new-hires. Hospitals made it part of admission procedure. Katherine McCuaig sums up this way

> The development of miniature X-ray films had given a new impetus to this somewhat outdated case-finding method, making it both physically and financially possible to x-ray not only a whole industry, or even community, but a whole province – and by 1943 R. G. Ferguson was suggesting that a worthwhile objective might be x-raying the whole population of the country within the next decade. At a cost of fifteen to twenty cents per person (including the salaries of doctors and technical staff) the new x-rays cost about one-tenth the price of the standard plate, and with ever – increasing Christmas Seal funds, "there is no city or municipality, small or large," Ferguson asserted dogmatically, "that cannot raise voluntarily the cost of such a survey."[9]

Saskatchewan, ever the leader among Canadian regions, had begun to X-ray entire communities in 1941. Ontario and Manitoba followed. By 1950 Saskatchewan had done two sweeps and was about to start a third. However, some were still being left out. Fixed X-ray sets were fine in larger towns and cities. Mobile equipment was taken into rural areas as far there were roads to run it on. But beyond the end of the road were the scattered aboriginal communities of the boreal and arctic regions. To reach them with this equipment, especially in the Eastern Arctic and along the Labrador, it had to be truly portable, and this was the contribution, in the first instance, of the Picker X-ray Corporation of Cleveland.

9 Katherine McCuaig *The Weariness, the Fever and The Fret: the Campaign against Tuberculosis in Canada 1900-1950* 187



This company was founded by James Picker, a Russian immigrant to the U.S., who trained as a pharmacist in New York City and shifted to the X-ray business after becoming an agent for the sale of Kodak plates to users of the new apparatus. [10] In 1929 Picker, a daring man, purchased an important

10 Most of what follows is from Anthony Palermo Junior, *A Legacy of Caring – the History of Picker International, GEC Review, Vol. 10, No. 2, 1995*

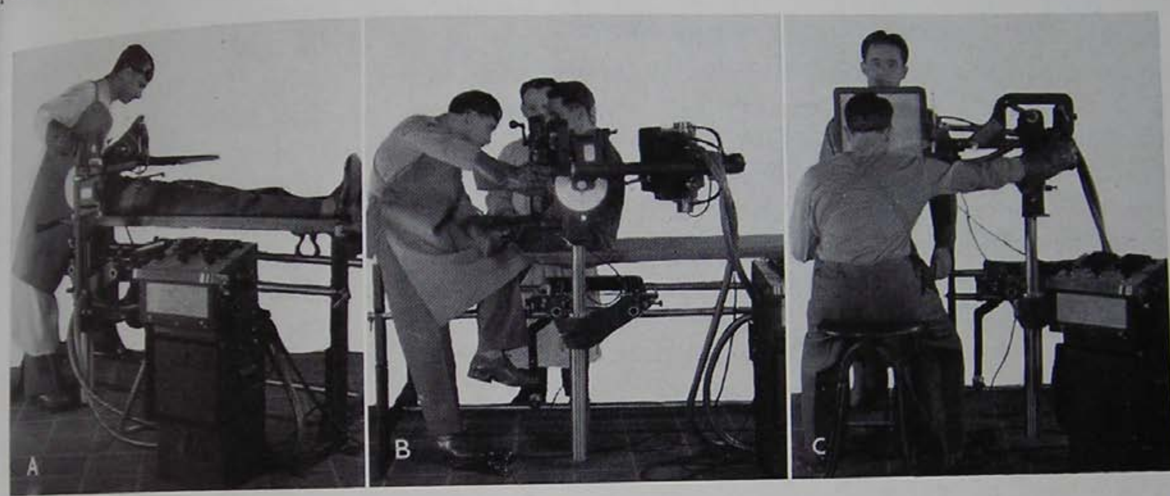


Fig. 2. The fluoroscopic adaptations of the x-ray table unit. Figure *A* shows the position of the C-shaped member for horizontal fluoroscopy and for foreign body localizations. Note the depth scale and skin marker manipulated by the left hand of the operator. The localization scale is in its position, fixed on the operator's end of the horizontal carriage. Figure *B* shows the adaptation of the C-shaped member for sitting fluoroscopy. A spacer falls into position to indicate the minimal focal-skin distance (12 inches). Figure *C* shows the adaptation of the C-shaped member for standing fluoroscopy. The range of movement provides for studies both of the chest and the abdomen.

Illustration from Alfred A. De Lorimier Wartime Military Roentgenology, *in* Radiology Vol 36 No. 4 April 1941

equipment manufacturer named Waite and Bartlett and also the assets of a prominent maker and designer of X-ray devices, and started a plant in Cleveland. Picker developed a sales and service force, and began to manufacture equipment as well as continuing to deal in the supplies and accessories. Things went well. Picker gave his line a stylish, moderne look, using chrome, colour, and streamlining on the first product, a vertical fluoroscope offered in 1931. By 1937, the company was responding to a design call from the Belgian army to develop a piece of equipment, presumably portable. Two years later Picker's son Harvey (later president of the company and currently a health care activist on the international stage) wrote to the Surgeon General offering to design a field unit which would no doubt be needed should the U.S. enter the war. The result was the U.S. Army X-ray Field Unit, a wheeled machine a little larger than a man, which collapsed into three chests – actually, five, counting fluoroscopic attachments and the transformer- and could be assembled in five minutes. Design criteria included a maximum weight per chest of two hundred pounds, which could be carried by two men. The set was extremely versatile. The table unit, X-ray machine unit, and mobile chassis offered nine-way adaptation. In the field it was used mainly as a fluoroscope, for finding "foreign bodies" in fallen soldiers. Film processing equipment along modular lines was also provided, and Picker engineers produced a 60-cycle gas-fuelled generator whose output corresponded to the requirements peculiar to X-ray generation.[11] Picker engineered and prototyped this product, bid on its mass production and won the contract, and subsequently trained another manufacturer to build it in order to provide the customer with a second source. Thirteen thousand units were put out, earning about four million dollars which James Picker returned to the Treasury, with the remark that "I did not want to make a profit on men dying." (According to Anthony Palermo, a Picker engineer for more than forty years, Harvey followed suit as the company supplied the military through Korea and Viet Nam.[12])

Immediately after the war, the Picker machines began to move north. Already in 1945 MacCarthy and Laidlaw, reporting on the southern portion of the Eastern Arctic Patrol (Montreal to Churchill) conducted from the *Nascopie*, complained of the lack of the apparatus.

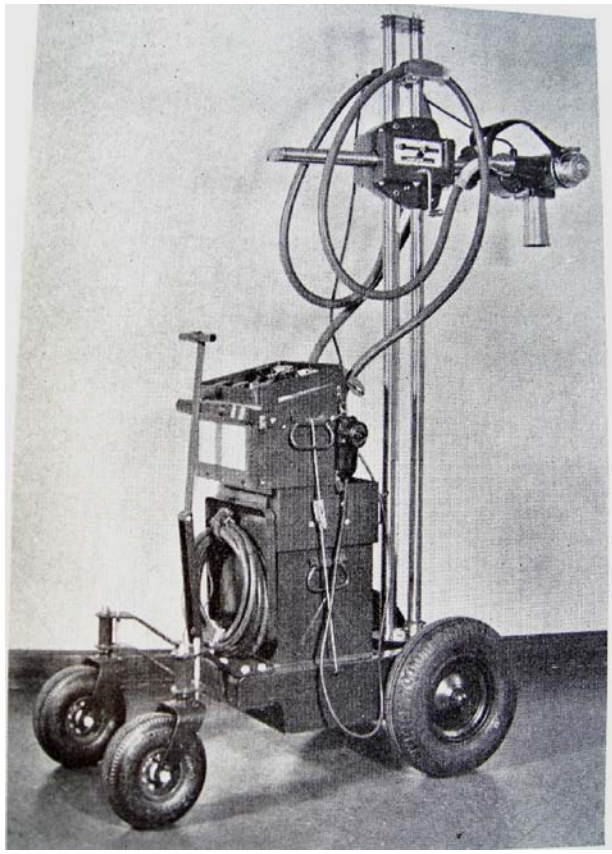
> In accordance with request, we attempted, as best we could, to ascertain how prevalent tuberculosis is among the Eskimos. However, as most of the patients brought to us were suffering from a variety of other conditions, our study of this particular disease was extremely limited…the handicaps of our being unable to make a wider clinical survey in the time at our disposal of being without X-ray equipment were unfortunate. It seems most important that all the natives should be examined carefully both by X-ray and otherwise in order to find out how many are harbouring tubercular foci…by using an aeroplane and a large motor boat, a physician and a technician with portable equipment might be able to go over the whole field during the summer months...[13]

Out west, Don Harkness, the technician in charge of the radiology department at the Camsell, and also of surveys conducted from that base, recalled for the Camsell Hospital history committee, that the Department possessed, in 1946, one 220 milliamp fixed unit, and one portable. In the late summer of 1947 he was able to acquire a second portable and an American army ambulance. This was very likely

11 Alfred A. de Lorimier and Major Maxwell Dauer, *The Army Roentgen-Ray Equipment Problem*, American Journal of Roentgenology, Vol. 54, No. 6, 1945

12 Personal communication, May 14, 2007

13 LAC RG 29 Vol. 2874 File 851-1-12 Part 1A



Lawrence Reynolds, The History of the Use of the Roentgen Ray in Warfare*, in* American Journal of Roentgenology Vol. 54 No. 6 December 1945

a Picker. The first mass survey undertaken with this equipment was at Hobbema in September of 1947. At the same time William Paddon, at North West River in Labrador, was struggling with few resources to deal with "a bottomless pool of tuberculosis patients" and no beds for them, neither there nor in St. Anthony. Paddon's coasting vessel, the *Maraval,* had been refurbished, and he now purchased a Picker Portable, and operated this machine, which proved "reliable and indestructible" for the next twelve years. During the first summer, he took 1100 chest shots, which "gave us our first accurate impression of the scope of the problem we faced…from then on we X-rayed everyone over three years of age once a year, comparing the film with the previous ones each season to detect even the smallest change …"[14]

14 W. A. Paddon, *Labrador Doctor*

Back in Edmonton, Harkness obtained one of the new photofluoroscope machines.

> In the winter of 1947 funds were made available to purchase a new X-ray unit manufactured by Picker X-ray, a 70 mm machine designed to do mass surveys. The principle on which the unit was designed was to have the patient fluoroscoped, then a camera would take a photograph of the fluoroscopic image. The camera contained a 70 mm roll of X-ray film and would allow a technician to take approximately four hundred and fifty X-rays per roll, thus eliminating the need to set up a darkroom to change the film after individual X-rays. This allowed us to X-ray up to one thousand persons in one day.[15]

A photograph in the Edmonton Archives from March of 1948 shows three techies and their truck, with a large gas or diesel generator in tow. Shortly they were off to the Blackfoot reserve where 1400 people were surveyed in two days. After this Harkness organized the hiring of summer help (pre-med students) and ran four surveys a year.

Meanwhile the EAP doctors got their wish and during the 1946 voyage of the Nascopie a survey of “all Eskimos available” was done. The equipment was a Picker portable “complete with generator”. All but 200 of the films made were processed on board, another first. Reading of the shots however had to wait until the medical party got back to Ottawa, where a team of three experienced chest specialists viewed them. Reckoning with an estimated population of six thousand, the doctors thought they had sampled pockets representing about thirty-seven hundred. Of these, 1,347 or 36 % were X-rayed. All age groups were sampled, except for children under five.

Noting that “This was the largest number of Eskimo films to have ever been obtained, “ the doctors felt able to make a few judgements. First, “the Eskimo is pretty thoroughly tuberculized “ in all areas. But also, ”There seems to be ample evidence that the Eskimo shows a marked resistance to tuberculosis. The widespread evidence of previous infection showing gross calcification with no evidence of activity seems to bear this out.” This implies that active cases would respond readily to treatment, i.e. to rest and “adequate” diet. In conclusion,

15*The Camsell Mosaic*

> It would seem that the Eskimo presents no special problem in the way of tuberculosis control inherent in their particular race. They have evidently been tubercularized for many years and have survived as a race in spite of a high morbidity and mortality rate and with no attempt made to treat or segregate open cases…The problem then is the environment and the mode of life of the Eskimo, plus the present insurmountable transportation difficulties …[16]

In the west it was 1950 before surveying among the Inuit began. Attention went first to the Yukon, where in one operation seventeen thousand were examined. The first attempt at a mass survey involved a doctor and two technicians who were flown into Cambridge Bay by the RCAF. The team then jumped around from this base using a Norseman with skis. Of 952 X-rayed, including 25 non-Inuit, seventy were brought out for hospitalization.

When the *Howe* took over from the *Nascopie*, she carried a portable unit along with the fixed set in the hospital section of the ship. (Also supplied by Picker, probably from their branch in Montreal.) The *D'Iberville* also had X-ray, which is mentioned by Simpson in his 1952 EAP report. The next major shift in EAP X-ray procedure occurred in 1955, when John Willis (of whom more below) became Indian Health Services Regional Superintendent, Eastern Region. The limits of what could be done from the Howe were to be surpassed by initiating a "saturation survey" with immediate evacuation – that is, sequestration of positive cases, who would then be conveyed to the nearest point from which they could be taken south by air. To that end, four additional medical parties would be dispatched to cover ground which the *Howe* could not. Presumably all four carried X-ray sets of some sort. Films were to be read wet, on the spot. And so it was done, for a decade, with extra medical parties eventually yielding to year-round nursing stations, and air transport steadily gaining over ship travel. Concern about stray radiation and over-exposure of the medical people and their patients, as well as electrical hazards, recurred throughout the working life of the Howe, and the struggle with the equipment and procedures seems never to end. On completing the 1950 tour, the radiologist insisted that the X-ray apparatus be given its own dedicated "converter", to avoid fluctuation of the current when other

16LAC RG 29 V 2874, F 851-1-12, Part 1-B demands were on the line. When the 463 films collected in that year were read at Parc Savard, they were deemed not as good as previously. Technicians were advised that they ought not to allow women to let their braids hang down their back.

> We may say that these hair braids have doubled the difficulties of giving an accurate X-ray reading in about 50 to 55% of the films. They produce shadows very similar to those of an exudative process and in the upper parts of the lungs in about the same regions usually invaded by an incipiens (sic) tuberculous focus.[17]

Assuming an accurate interpretation could be made, many films were not meaningfully identified because the technician's version of this or that person's name was impressionistic and indeed useless unless the disk number was also provided. Keeping the shots in order from year to year, and making sure they got onto the Howe each spring to allow comparison was still a stumbling block in 1957. And perhaps the radiologists had become more demanding. Joseph Lee, on board that year from Quebec to Resolute, complained that the x-ray machine was one of low output, necessitating long exposure times.

> This time varies according to the thickness of the chest, which in an Eskimo is usually considerable. Also occasional bone X-rays are attempted. With the inability to adequately explain procedures to the patient because of language difficulties, various errors occur which are exaggerated because of the long exposure time. [18]

Lee recommended a switch to a faster film, which would half exposure time; faster intensifying screens, which would halve it again; and a new, faster developer as well. Whether Lee was heeded or not, the following year's team X-rayed an amazing 2269 persons and conducted complete physicals on 1571 of them.[19] Most importantly, the films of previous surveys, properly labelled, should always be shipped with the medical party. This was the complaint of H.E. Peart, the radiologist from Resolute to Quebec and Lee's colleague at the Hamilton San. However, in 1959 the INHS Annual Review of

17 LAC RG29 Vol 2875 file 851-1-12, Part 3A, Labrecque to Leroux
18 LAC RG 29 V 2875 F 851-1-12 Part 6 Lee to Moore, Jan. 25 1958.
19 LAC RG29 V 2875 File 852-2-12, Part 6 "Annual Report Eastern Arctic Patrol 1958"

Medical Services claims that this problem is solved by the "Central Film Library", in the regional offices. "On the Eastern Arctic Patrol, where films are taken, developed and read, the films of previous years are made available from this library for comparison. Radiologists are pleased with this arrangement and report that comparison films make their work much easier and their fateful decisions (i.e. to evacuate or take a chance on leaving doubtful cases) more reliable."[20]

The *Howe*'s fixed set was replaced at least once, probably in 1959, and perhaps again in the mid sixties during the mass migration to solid-state equipment. In 1969 as the Coast Guard prepared to divest itself of the old warhorse, someone was sent aboard to inventory the surplus medical equipment.[21] The shipboard hospital quarter was a five-room suite. When someone went through it on 9 October 1969 they found that most of the equipment was in good condition. Some had been "soldered" to the walls and was not practicably removable. There was a surgery, with anaesthesia apparatus, operating table, lamp and sterilizers; a dentists office with two chairs; a dispensary; a files and records office, for X-ray storage; and an X-ray room containing one X-ray head & tube unit, fixed on a movable column "Picker", with rule indicator 10" to 48", ceiling & floor rails, Style 1352G Serial No. 1082, one Transformer X-Ray Unit, "Picker" for unit, table and control, one X-Ray table, "Picker". 200 milliampered Unit, "Recipromatic", and a variety of smaller appliances for handling the films…

I said that the helicopter and the X-ray apparatus revolutionized medical care (hence politics) in the Eastern Arctic. The helicopter allowed authority to go where it otherwise could not, to take in doctors and nurses and to bring out the sick and the injured. X-ray allowed the delineation of the true scope of the TB problem. It also gave the doctors greater confidence in marking for assimilation into the

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20 A study done in India in 1961 concluded "mass radiography with a single picture of the chest has a fairly wide margin of error, which is partly reflected in the great differences in reading of X-ray films by different individuals or even by the same individual on different occasions. If the total number of genuine cases in a community could be known, the magnitude of error involved could easily be estimated. But available methods of knowing he total number of tuberculosis cases in any given community are inadequate; other standards against which error may be measured are rather artificial. In fact, even a universally accepted definition of a case of tuberculosis is not available. Raj Narain and M. Subramanian, *Limitation of single picture interpretation in mass radiography*, 1962, online at OpenMed @NIC, June 2007.

21LAC RG 12 V 2943 F 9150-6 Part 2

medical system persons who otherwise, since they showed no symptoms, would neither present themselves for examination nor, if examined, be readily diagnosed; nor, if diagnosed, accept treatment. However, these appliances themselves had to be gotten up there from the Southern places of manufacture, and for that other developments were required: ships and planes able to move cargo reliably across great distances though extremes of weather. In the West, X-ray went by road, by river-going boat, and ultimately by plane. In the east, transport through the fifties was mainly by ship.

The Howe from its helicopter. McMaster Health Sciences Archive, Rabinowtiz Collection

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