A STUDY IN CAMP SANITATION

By
Major Edward L. Munson, Medical Corps, U.S.A.,
Senior Instructor, Department Care of Troops,
and
Captain LeRoy Eltinge, 15th U.S. Cavalry,
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Situation:

In preparation for war, a division is being mobilized at Fort Leavenworth. The 1st Inf., Col. A commanding, accompanied by its field train and with the regulation amount of tentage, has marched southeast to join, and on Sept. 1st, at 11:30 a.m., has reached the point 17, when an officer of the division staff gives Col. A the following message.

Fort Leavenworth, Kas.,
1 Sept. —— 10 a.m.

"Commanding Officer,
1st Inf.

All available camp-sites east of Sheridan's Drive Ridge are already occupied by troops. You will select a camp-site for your regiment on Salt Creek. Your supplies will be delivered by rail at Miocene Station, near Frenchman.

By Command of Maj. Gen. X,
Y—— Z——,
Chief of Staff."

*For additional reference, use 4 inch map of Fort Leavenworth and vicinity.

On inquiry of the staff officer, Col. A learns that the mobilization of the division is far from complete, and that no decision as to when it will be moved to the front has as yet been reached.

* * * * *

On September 2d, the Sanitary Inspector of the Division reports that the sanitary conditions of the 1st Infantry camp, as established under the above order, have been reported to him as being unsatisfactory as a result of the sanitary recommendations of the regimental surgeon being disregarded. General X orders the Sanitary Inspector to confer at once with Colonel A, investigate the matter, and in the name of the Commanding General to direct such measures of sanitary improvement as appear to be necessary.

Complying with the above orders, the Sanitary Inspector proceeds to the camp of the 1st Infantry, which he finds on the Kickapoo—17—Frenchman road, in the field south of the Dolman house and in the immediate vicinity of the road. The camp, as shown in Map I, herewith, is pitched according to the plan given in the Field Service Regulations for regimental infantry encampments. The site of the camp is a plowed field with a gentle slope from the Dolman house southeasterly to the ravine of Salt Creek, the latter being the source of water supply. Regimental headquarters are located toward the top of this slope, while the company latrines are close to the edge of Salt Creek. On the other side of the fence which runs east and west from the Dolman garden to Salt Creek, is pasture land with scattered stumps. The area east of the Taylor orchard and between the two forks of Salt Creek is grassy pasture similar to the pasturage on the Dolman place, from which it is separated by an osage-orange hedge.

The Sanitary Inspector summons the regimental

surgeon, and with him calls upon Colonel A and states the nature of his visit. On his request that the regimental surgeon state the sanitary objections to the camp as established, the latter replies as follows:

The character of the soil is heavy clay; and rain, which can be expected at any time at the present season, would convert the plowed ground of the camp site into a mire. Moreover, while the camp is correctly pitched according to regulations, certain companies of the regiment, noting especially Company L, have their line of tents in a depression which would naturally receive much storm water in time of rain. The picket line is located on a slope which necessarily drains through the camp of the 3d Battalion. He states that there was some delay in establishing the camp and that the latrines were not provided for some hours, during which time the men resorted to the woods along the bank of Salt Creek, with the result that the soil has been generally polluted in that vicinity; also that the latrines are so close to the bank of Salt Creek as to be in dangerous proximity to it as a source of water supply, and that the latrines of Companies M and Machine Gun, in order to preserve the regulation alignment and distance, have been carried over the bank almost down to the water itself. He states that, in the absence of official orders properly regulating the matter, the men have procured their water for drinking and cooking purposes at various points along Salt Creek, and that the animals have been watered, clothing washed and persons bathed above the point at which much of the water for drinking purposes has been drawn. He calls attention to the fact that refuse and kitchen slops have been thrown into shallow pits located near the company kitchens, as directed in Field Service Regulations, but that these are already overflowing after only a day of use.

The Sanitary Inspector remarks to Colonel A that, under the circumstances, the latter would undoubtedly be interested in personally seeing conditions as they exist in his camp, and suggests that they together investigate and verify the above statements. To this Colonel A assents, and accompanied by the regimental surgeon they make a round of the camp, finding conditions to be about as reported.

On inquiry of Colonel A by the Sanitary Inspector as to why this camp site was selected, the former replied that it furnishes a convenient place for the establishment of a regimental camp in the prescribed form; also that it is near the point at which supplies are to be delivered and is on the main road as required for a mobilization camp. In its present location, the formation is not only regulation but sightly, and from headquarters on the upper part of the slope he can command a view of it in its entirety. He remarked that he did not entirely approve of having picket lines located above the camp, but that this position was so laid down in the Field Service Regulations, with which he thought it was necessary for him to comply; and that the same reasons had governed the location of the latrines. It was true that he had permitted the animals to be watered from the creek at the south of the camp; this was due to the fact that the banks of the ravine at that point were less steep, rendering the water supply much more accessible. He could find nothing in Field Service Regulations which specifically prohibited such an arrangement, though he was forced to admit that it probably was not contemplated. He stated that the fact that Company L had its tent line in a depression was due to his desire to conform to the camp plan given in Field Service Regulations. He would have encamped on the ridge just north, covered with grassy pasture, but for the fact that it would have broken up his

camp; stumpage would not have permitted the intervals and alignment of tents and companies, and the osage-orange hedge would have prevented the commanding officer from having his regiment at all times in compact form under his eye. Moreover, this area was further from the road than Field Service Regulations seemed to authorize. He admitted that the plowed field in which the troops were encamped was at present dusty and in wet weather undoubtedly would become very uncomfortable; but conditions were such that there was no other ground in the vicinity in which he was ordered to locate, excepting plowed fields, which would enable him to camp his regiment in the prescribed manner. He did not desire to disregard the recommendations of his regimental surgeon, but since they did not seem to coincide with Field Service Regulations, he felt it his duty to conform to the latter.

Replying to the above, the Sanitary Inspector invited the Colonel's attention to the fact that it was not contemplated that Field Service Regulations with respect to encampments should be inflexible, but that they were distinctly stated in paragraphs 612 and 613, edition of 1905, to be subject to such reasonable interpretation and modifications as might seem to the commanding officer to be necessary to meet local conditions properly; it was quite true that the plan of the camp as laid out in Field Service Regulations was most convenient for the purpose of administration and sightliness, but in the absence of any military necessity it was not intended that either of these conditions should be allowed to outweigh the more important matter of sanitation.

While it was true that Field Service Regulations said that a mobilization camp should be on the main road, in another place they stated it should not be so close as to have the noise and dust annoy the inhab-

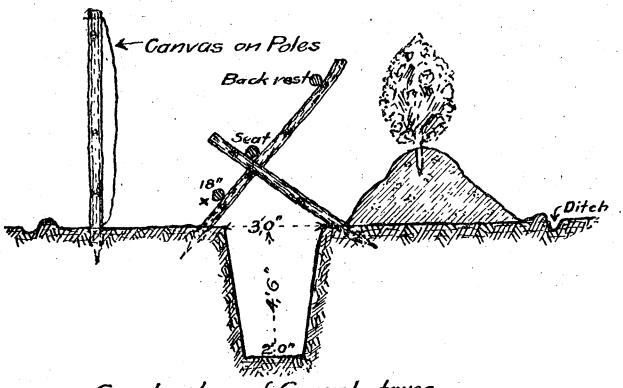
itants of the camp. The intent seemed to be clear, that a large camp should not be located so far from a main road that the hauling of supplies become difficult, but that at the same time the tents of the individual regimental camps should be located far enough from the roadside to keep the results of traffic from becoming a nuisance and a menace to health.

As Colonel A himself appreciated, the plowed field would make an uncomfortable, dirty camp ground whether the weather was fair or foul, and men having to sleep on such ground in wet weather would necessarily be chilled and uncomfortable. The Sanitary Inspector would, therefore, advise—in view of the fact that the purpose which caused the encampment of the regiment in this vicinity would probably require its retention here for some little time—that the present camp site be abandoned without delay.

For the new site, a convenient and suitable place was at hand in the adjacent pastures of the Taylor and Dolman farms, which not only presented the benefits of a tough, well-cropped turf, but of a range of smooth high ground draining in two directions. The stumps on this site would undoubtedly make it necessary to locate the tents in a somewhat irregular way, yet this was of no importance except from the aesthetic standpoint, and the stumps themselves were not without considerable practical utility as seats and for other purposes. Under the conditions of terrain in these pastures, he would recommend the encampment of the regiment by battalions, according to the arrangement shown in Map II, herewith, cutting the necessary openings through the osage-orange hedge referred to already. The new location of headquarters, the hospital and guard tent, as shown Map II, is specifically authorized in Field Service Regulations, and would permit of sufficiently good military admin-

istration, control and oversight of the camp.

Under this new arrangement, the latrines would be located on a slope draining away from the tents and from the water supply, and there would be little danger of the flooding of the former in case of rain, as they would be located just below the crest of the ridge. To facilitate their care, it would undoubtedly be better to establish battalion latrines rather than one for each company, constructed according to the accompanying plan hastily drawn by the Sanitary In-



Construction of Camp Latrine

spector. A seating capacity of ten per cent should be provided, which with battalions having a strength of about 500 men would mean a length of about ninety feet for each such latrine trench. The locating of the 1st Battalion latrine makers is available for the guard, scouts and hospital. Inasmuch as the Chief Quartermaster of the Division had announced that neither incinerators nor trough latrines would be available for use in this camp, especial care in respect to the sanitation of the excavated latrines, and the prevention of soil pollution, would be necessary. Under these conditions, a sentinel should be placed over each latrine to enforce proper conduct and the maintenance of due cleanliness by the men. Shovels should be provided and each man required to

scatter over his dejecta a little of the earth piled to the rear, beside which the latrine should be visited by a fatigue detail morning and afternoon, the vicinity carefully policed up and any exposed excreta covered.

He duly emphasized the fact that, in every considerable camp, the existence of soldiers who are reservoirs of typhoid germs requires that the disposition of human excreta be considered from a broader sanirary standpoint than has been customary in the past. Since the various soldiers who are disease-germ carriers are not known, they can soon infect any or all of the latrines in a camp. The only safe way, therefora, is to regard all human excreta in the mass not only as undeniably offensive but as almost certainly infectious. This implies the necessity of destroying the danger of such infection as soon as the discharges leave the body, either by their removal under proper conditions or by the destruction of the infectious agent by fire or chemical disinfection. A safe sanitary maximum might be formulated as follows: *Either the excreta must be removed or destroyed, or the troops must be removed or they will be destroyed.* And the need for too frequent change of camp site is a reflection upon the discipline and police maintained by the commander.

Hence, once a day, preferably while the command is at drill, the fatigue detail should see that each latrine trench is thoroughly burned out with straw or sweepings which have been well sprinkled with mineral oil. This daily burning out, which only takes a few moments, accomplishes not only the destruction of any disease germs but also of the eggs and maggots of flies which may be on or near the surface of the walls and bottom of the trench. The smoke also drives away the adult flies and its lingering odor deters these insects from again returning thereto. If sufficient spare canvas is available, it should be

used to roof the latrines for protection against rain and sun. Orders should prohibit entrance of the Dolman buildings by the men, to prevent the commission of nuisances by them therein.

The picket line would, in the new site, be located on a slope below the camp instead of above it, would be to the leeward of prevailing winds, and would be convenient to water and shade. Any question of difficulty of watering the animals at that point could be readily met by scaling down the bank and, if necessary, corduroying a watering place in the creek bottom.

He would advise that orders be issued prohibiting bathing of the person and the washing of clothes excepting in the bends of Salt Creek lying immediately east of the proposed camp of the 3d Battalion; that the watering place for the animals be designated as immediately south of the new location of their picket line, and that the point from which water for drinking and cooking purposes could be secured should be specified as at the junction of the creek and the osage-orange hedge.

At this last point a small dam should be built to deepen the shallow water, the creek bank scaled down for easy approach and trees felled to form a platform so that water may be dipped up without muddying or contamination. Sentinels should be posted over this impounded supply, while patrols should be maintained to keep the men and stray animals away from the creek above the dam for a distance at least as far as Frenchman, to limit the great danger of pollution. Examination of the map shows the drainage area of Salt Creek to be exposed to contamination from farm houses, barnyards, railroad trains and other sources of pollution. This has been further verified by a general sanitary survey of the vicinity. It will be advisable therefore to boil all drinking water.

In the hot weather at this season frequent bathing is both a necessity and comfort, and, as the mud bottom of Salt Creek is very uninviting for bathing purposes, he would recommend that trees be felled and a dozen or more log platforms built over the waters of the creek at the designated bathing point, so that the men could keep themselves and their clothing out of the mire while washing their feet and taking sponge baths; if water cans with faucet and sprinkler could be obtained for shower-bath purposes they should be set up at these points.

As the sun's rays at this season are intensely hot, he would suggest, in view of the probable prolonged stay of the regiment, that improvised shades be made for mess and lounging purposes near each company kitchen, there being abundant poles, brush and branches available for this purpose in the timber along Salt Creek. Such sun screens would not only add to the comfort of the men, especially if rough benches and mess tables were also improvised, but would very greatly assist in preventing general contamination of the camp site by causing the men to eat together under conditions where all refuse food, crumbs and plate scrapings could readily be collected and removed. It was quite apparent, in traversing the camp, that the men had taken their rations to the shelter of their tents for eating, and flies were observed swarming over unwashed mess tins and where refuse food had been carelessly thrown on the ground around the tents. He called the Colonel's attention to the fact that if such soil contamination was permitted on the new camp site, it would only be a very short time before the camp would again have to be moved, and that such movement of the camp would require far more trouble and labor than the lesser but persistent effort required to keep an uncontaminated site reasonably clean.

In response to an inquiry by the Colonel, he stated that the scattering of food scraps, by itself, might do no very great harm, but that such conduct was an index of a general lack of discipline which was almost certain to lead to far more serious sanitary faults, such as evasion of use of urine tubs and latrines. And at this season flies might be expected to breed wherever soil was organically polluted.

He reminded the Colonel again that in his regiment there undoubtedly was at all times an indefinite but not inconsiderable number of men who were themselves healthy but who for long periods acted as hosts or living reservoirs of virulent typhoid fever-germs. These germs, passed out from their human carriers in the bowel and urinary discharges, were incapable of independent locomotion, and in camps were chiefly powerful for harm through the presence of an intermediate agent—the fly—by which they were conveyed back from the sink to the soldier and from fæces to food. Flies breed in and feed on filth, and nothing was truer than the sanitary axiom "*No filth, no flies.*"

The Colonel here expressed surprise at the large number of flies which he noticed already in the camp, although the latter had been established less than twenty-four hours. He was apprehensive that they would shortly increase to a terrible plague and was rather pessimistic as to the possibility of preventing the latter. To this the Sanitary Inspector replied that in riding into camp through the Dolman yard he had noticed a large heap of stable manure, of at least six months accumulation, lying behind the barn and only a short distance from the officers' latrines, the headquarters tents and the line of kitchens. In this manure-heap had undoubtedly bred the myriads of flies of which there was already just complaint, and the short distance to the camp and its location to the leeward of the prevailing winds at this season

would naturally favor their further appearance in the present camp as fast as the new swarms were hatched out. The proposed new location was much better in the above respects, and in abandoning the present camp ground most of the flies would undoubtedly remain behind. To prevent further development of flies in the manure heap on the Dolman place, the Quartermaster should have it hauled away and burned without delay; or if removed and thinly scattered over fields at a considerable distance it could do little harm.

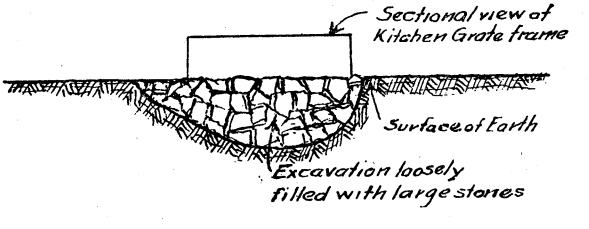
Hereafter the regimental wagons removing manure from the picket line should also remove the daily accumulation at the Dolman farm, as if this task were left to the owner it would not be accomplished to the best interests of the troops. If the new camp site was kept scrupulously clean there would undoubtedly be no great development of the fly pest; if there were such development, it would be a reflection upon the sanitary administration. It probably would not be practicable under the circumstances to enclose the kitchens and messes with fly screening, but a requisition for a small amount to be used as food and dish covers would be approved.

He complimented Colonel A on having so promptly secured urine tubs, and brought out the fact that these tubs, to be of benefit, required that the company commanders should see that they were conveniently located for the men at night, on a marked area readily susceptible of disinfection by fire or germicidal materials, that they were removed early in the morning, emptied into the pits where other excreta was disposed of, and that they were then thoroughly cleaned, sunned and stored for the day near the latrines. In passing along the line of company kitchens, he had noticed that several of these tubs were being used to hold kitchen slops. This was a highly dangerous

proceeding, as the urine in a considerable proportion of persons recovered from typhoid fever was known to contain typhoid germs in vast numbers for many weeks and months. The use of contaminated urine tubs for kitchen purposes was thus not only unpleasant to consider but greatly increased the liability of food infection through transmission by flies and handling.

While on this subject he called the Colonel's attention to the fact that, in the new site, pits for the absorption of kitchen waste and slop waters should not be dug. In the clay soil of this locality there would be little or no loss in bulk by seepage—as had in fact already been demonstrated in the present camp—and intolerable nuisances would very shortly be created. While Field Service Regulations say that "Liquid refuse will be thrown into pits", presumably for absorption, they do not specifically say that pits must be located in the camp site, even though so shown in the plan of the camp. One recourse in the present instance was strictly to limit the amount of solid and liquid garbage as much as possible, and haul it away twice daily for burial in the flat ground in the vicinity of 17; pending which time it should be stored in the covered garbage cans which could be obtained by requisition on the Chief Quartermaster of the Division.

A very satisfactory arrangement where stones were plenty in the vicinity, as they unfortunately were not in this clay soil, is such as the Sanitary Inspector illustrated for the Colonel in the accompanying sketch. In this, the fire grate of the company



kitchen is placed over an excavation filled with stones of good size. The kitchen fire keeps these stones hot and the latter rapidly evaporate the liquid wastes which are poured into the side of the excavation from time to time, while the solid wastes are dried out on the flat surface of the upper layer of stones and are then raked back into the kitchen fire and burned. This plan so effectively solves the problem of the transportation and disposal of kitchen wastes that he would strongly advise Colonel A to install the system as soon as he could find opportunity to send his wagons for the necessary stone to the rock outcroppings on Sentinel Hill or other convenient source.

Refuse, camp sweepings and stable manure from the picket line should be hauled away daily to an improvised crematory, such as was rapidly outlined in the accompanying sketch. This simple arrangement the Sanitary Inspector stated was very satisfactory in its results, anything up to and including a dead mule being effectively destroyed. The rock lining of the crematory excavation, which is about three feet deep and twelve or fifteen feet across, is first heated up by a hot cord-wood fire and the refuse to be destroyed is then thrown in. Liquids are evaporated and solids are dried, carbonized and consumed. The rock cone in the center, about five feet high and four feet wide at the base, serves for the purpose of creating the necessary draft.

Camp Crematory

He had noticed that some of the company cooks had thrown greasy water on the ground. Undoubtedly they would deny it, but the presence of swarms of flies on certain areas near the kitchens was proof positive to the contrary, for flies never fail to detect

and resort to areas contaminated in this way, and knowledge of their habits may thus greatly aid in sanitary inspection. In the new camp, such contamination must be absolutely prevented.

He called attention to the fact that, in a camp of any permanence, there is usually opportunity to make the men comfortable at night. Here no special effort to this end seemed to have been made. He would suggest that in the new camp the men be required to raise themselves from the ground by bed frames made from branches of the trees along Salt Creek and covered with bed sacks stuffed with hay purchased by the Quartermaster from the Dolman farm. Bed sacks were available for issue by the Quartermaster's Department.

In breaking the old camp to occupy the new site, it was, of course, necessary that the latrines and garbage pits which had been dug should be carefully filled up and the camp area thoroughly policed, and that a police party make a thorough search of the banks of Salt Creek in the vicinity of the present and proposed camps for the purpose of discovering and burying such refuse or excreta of men and horses as might be present.

In taking his leave after the above discussion of the situation, the Sanitary Inspector remarked that he felt quite sure that the mere bringing up of the above unsanitary conditions with Colonel A would be all that was necessary to secure their correction, and that he should so report to General X. While unquestionably there were other matters of a sanitary nature which also should be given consideration at the present time, he felt that they could undoubtedly be safely left by him to the initiative of the regimental surgeon and the due support of the latter by his commander.