

C. S.

MEDICAL Board of Health
Miscellaneous)
PUBLIC WORKS (Misc.)
MISCELLANEOUS (General)

19 44.

No. 26/44.

S.C.O.

SUBJECT.

19 44.

24th February.

Previous Paper.

See 92/42.

SEWAGE DISPOSAL

General.

MINUTES.

1. Minute from Hon. S.M.O., of 10. 3. 43.
2. Minute from Hon. S.M.O., of 11. 3. 44.
3. 3 p.n. from Secretary of State of 5. 2. 43.

Excerpt from M.P. No. 92/42. (4)

Hon. S.M.O.,

(3) will interest you and you may withdraw it if you like, but I am afraid no labour could be found here willing to undertake this work.

K.B. 1. 9. 43.

H.C.S., (5)

The use of compost in the gardens is something for the Agricultural Dept., to consider. Before the Sanitary Cart was introduced "night Soil" was dealt with in this way. A mixture of night soil animal manure, refuse and peat mould ought to make a good preparation to enrich the soil.

(2) There was great interest shown in the recent "broadcast". I think you can assume that the public is overwhelmingly in favour of this scheme being pushed through. Many people have spoken to me about it.

Geo. K.

S.M.O. 2. 9. 43.

D/A., (6)

to see (3b) onwards. Any comments ?

K. B. 4. 9. 43.

H.C.S., (7)

Sorry I have detained this so long. The article or part of it can be published but I think that the local people can usually get what animal manure they require - the Dept., has not sufficient labour to undertake this work at present and I was unable to persuade force 122 to undertake it when they arrived.

J. G. G.

21. 2. 44.

Subsequent Paper.

0040/F.

(9).

Hon. S.M.O.

I believe we discussed making this change some time ago but I cannot remember why you thought it inadvisable. It would obviously be preferable ~~now~~ now be possible. I should be glad of your present views.

K.B.
24. 2. 44

(10)

H.C.S. I saw Skilling & S. Carter who promised to write me confirming his statement that he refused to work at night as in the past.
② Skilling also informed me that he had discussed the matter with his helper who took the same attitude. Browning has written me and I enclose his letter //

R.H.
28/2/44

(11).

Spindle from Hon. S.M.O. of	28. 2. 44.	12.
Letter to Secretary, F.I.R.L. of	29. 2. 44.	13.
Letter from Mr. C. J. Skilling of	28. 2. 44.	14.
Letter from Secretary, F.I.L.F. of	27. 3. 44.	15. R.H.
Letter to _____	31. 3. 44.	16. R.H.

(12)

Discussed with Fed. Ctee. representatives.

- Agreed.
1. Skilling has no case for extra pay unless he has gone back to night work, for which he was originally engaged. He is not a union man.
 2. Whether Browning is underpaid or not to be rediscussed by Ctee. If not, Ctee will order him to work at night. If a rise is recommended Ctee agree that it should not be given before Skilling gets me what will, in any case, be conditional on his agree first to work at night on present rate.
 3. Ctee will write in about Browning.

K.B.
6.4.44

R.H.
15.4
30.4.44

18. Letter from Secretary, F. I. R. L., of 5. H. H. H.

19. " " " Falk. & S. Labour Federation 12/5/44

25.4.44

26.5.44

(20)

Wm. S.M.O.

To see if we (13). 4.4.44. - unless you wish to discuss further with me first.

KB
18/5/44

H.C.S.

(21)

All the parties taking part in this discussion have had two main objectives (a) To get more for doing less and (b) to embarrass govt. This is a regular gambit here which has had a good deal of success in the past. My personal view is that we should carry on as we are doing. I think it unlikely we shall hear more about it.

For K
to me

19.5.44

(22)

Re

Discussed with S.M.O. He advises (a) that in spite of the attitude of the Union he is not prepared to take the risk of ordering them men to do the work at night as they might still resign & the service collapse & (b) that he does not consider day-time collection a cause for complaint anyway. He recommended that no action should be taken at any rate until more pressure was applied by the public.

2. I informed him that the attitude of the Union was entirely helpful & that his views about the respective merits of day & night collection were a surprise to me in view of previous discussions.

3. I pointed out the collection of night soil was a departmental responsibility & that if his advice was as in para 1 above, I did not propose to take any further action. 22/5/44. P.O.

Letter from Secretary, F.I.R.L., of 31/1/45.

23.

(24)
Hon. Secy.
For your observations on red (23) pt.

W. G. Jones
8/2/45.

H.C.S. (25) ① Please see my minute of 19.5.44 on sheet 2 of this M.P.

Conditions have not changed, nor have my views, since you went into the matter with the League last year.

It is clear from red 18 that Mr. Evans appreciated that his organization had been ill-advised and the final paragraph of his letter of Apr 5.44 shows that the Committee merely wanted to ventilate their ideas.

② It should soon be possible to make concrete proposals that will lead to the elimination of the San. Gates and his "obnoxious nuisance".

Scott
8.2.45

(26)

G.F.
Draft letter to F.I.R.L. Submitted
KB.
19.2.45 ✓

Letter to Secretary, F.I.R.L., of 21. 2. 45.

27.

W.

28.

(29)
W. L. L. L.
Please read this M.P. & come & discuss it with me
KB.
17.6.45.

H.C.S.

(30)

It has now been arranged, that the sanitary carters will collect the night soil at the following hours. 1st September - 1st April, at 5.30 a.m., to finish before 8.00 a.m. 1st April - 1st September, at 5.00 p.m. in evening; or else in the morning, to finish before 8.00 a.m.

The Sanitary carters have asked, that water & a tap be laid on to the sanitary jetties, & they also ask that a hut may be moved to the paddock, to provide shelter for the horse. They also request post-nails for the horse in winter.

They point out that the sanitary cart has been repaired three times recently, and they say that a new cart will be needed soon.

G. D. Arthur
no

31. Letter to Secretary, F.I.R.L., of 28. 7. 45.

Note

(32) On 29/ix Mr. Shilling asked for an interview, at which he raised the questions of increased pay, & local leave. He stated that he had not, & was not carrying out the work at the times stated in (30). He was then warned of the possible effect on his appointment & English leave of insubordinate conduct, and told that other matters would be discussed when his orders were being obeyed, but not before.

On 13.x. He stated he was obeying instructions. As far as I can gather he is collecting early tho' he does not always finish before 8.0 am.

As regards local leave, I got the impression that he does not really want it, only cash in lieu. I informed him that this was not Govt. practice, but that he could have the full 6 weeks due to him if a deputy could be found, & requested his help in finding one. He has not raised the matter since.

M.S. S.M.O.

CS

33.

Waterborne Sewage - Stanley.

Extracted to 0040/F (Develop. Policy)
Sewage Disposal

This should I think be
carried out as a CDW scheme
and estimates shd. be prepared —
if we wait for private enterprise
we shall never get it done.

MC 10/vii

all
21.7

There is another fee —
the fee made of private
in 1946

all
21.7

(48.7)

CHOKED see 0040/F

No. _____



MINUTE.

10th March, 1943.

From

SENIOR MEDICAL OFFICER,
THE ~~COLONIAL SECRETARY~~

Stanley, Falkland Islands.

To THE HONOURABLE,

THE COLONIAL SECRETARY,

STANLEY.

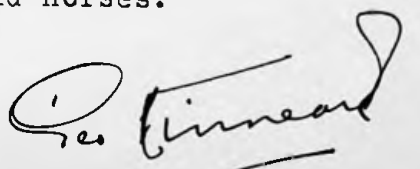
Re:- Transport.

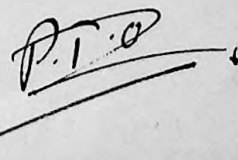
When the Medical Department took over the 'night soil' business from the Public Works Department it was found that the horse used by the Sanitary Carter was unfit. This horse was shot and was replaced by one imported from Montevideo. Subsequently it developed that the second horse controlled by the Public Works Department was also unfit for heavy duty and as a result the imported horse was exchanged for him.

This old horse has been doing the carting for the past 6 or 8 months but according to the Sanitary Carter he is unfit. The horse is doing the work now but when the cold weather comes with ice and snow he may well be unable to carry on. A further old horse, that had been pensioned, was loaned by the Agricultural Department to the Army and the carter reports that this horse is now in better shape than the one he is using.

If the Public Works Department has now solved its transport problems perhaps the horse which we imported can be returned but if this is not so then I think the situation should be reviewed. We do not want to find ourselves without a horse for the Sanitary cart in the depths of winter.

Perhaps the Executive Engineer could make a statement about the return of the imported horse and the Director of Agriculture about the fitness of the two old horses.


SENIOR MEDICAL OFFICER.



Copy to Executive Engineer for information.

*No.

MINUTE.

(It is requested that all reference to this minute, the above Number and the date may be quoted.)

19

11th March,

43.

From

To

The Colonial Secretary

The Honourable

The Senior Medical Officer,

Stanley, Falkland Islands.

STANLEY.

Red 36A
With reference to your Minute of the 10th March, the Executive Engineer now has a second young horse ready for breaking in. This will be done before the winter and he will then return the "imported horse" for use in the Sanitary cart, keeping the young one for P.W.D. work.

K. G. BRADLEY

Colonial Secretary.

305/27.
40
3

COPY

✓

15591/42

The Under Secretary of State for the Colonies presents his compliments to the Colonial Secretary, Falkland Islands and is directed to transmit, for information, a copy of the Secretary of State's circular despatch of the 25th October, 1941, regarding the composting of village refuse and nightsoil.

Downing Street,
5th February, 1943

CIRCULAR

Downing Street,

25th October, 1941.

Sir,

I have the honour to transmit for your information a copy of an article on the composting of village refuse and nightsoil by Dr. J. W. Scharff, Chief Health Officer, Singapore and to request that it may be brought to the notice of your Medical and Agricultural Departments.

2. I would suggest that consideration should be given to the reproduction of the article in local official agricultural and medical publications where these facilities exist.

3. As you are aware the use of compost in the cultivation of crops is one of the ways in which the fertility of the soil can be conserved or enhanced and the methods of utilising nightsoil in the preparation of compost as described by Dr. Scharff would appear to present the opportunity of harmonising sanitary requirements with agricultural needs.

4. If, therefore, you consider it advisable to arrange trials of one or both of the methods detailed in the article I should be glad to receive a report on them in due course.

5. I regret that it has been impossible to supply you with more than one copy of Dr. Scharff's article, but if additional copies are required it may be possible to obtain a small number direct from the Director of Medical Services, Straits Settlements, Singapore.

I have the honour to be,

Sir,

Your most obedient, humble servant,

Moyue

The Officer Administering
the Government of

36

COMPOSTING*

THE SAFE CONVERSION OF VILLAGE REFUSE AND NIGHTSOIL INTO A VALUABLE MANURE

BY

J. W. SCHARFF, M.D., D.P.H.
Chief Health Officer, Singapore

The Chinese from time immemorial have used human excrement as an important and never failing source of manure in their agricultural pursuits.

Indeed one cannot help being struck, almost everywhere, in Malaya by the success and hardihood of the so-called Chinese squatter in rearing vegetables. He succeeds in cultivating luscious crops on almost any kind of land, however wretched or inhospitable the conditions may appear to be.

The faculty of the Chinese market gardener in making infertile soil fertile, and in maintaining that fertility, is largely due to his clever use of freshly fermented nightsoil and urine.

Though vegetables thrive, the practice of putting human wastes directly on the soil is dangerous to health. The heavy toll of sickness and death from various bowel diseases in China is well known.

The Chinese living on the land in China, are an easy prey to a swarm of filthy parasites, and yet, in spite of this grave handicap, no one can deny the virility of the race and their ability to maintain themselves under conditions which would be fatal to those less inured to such devastating infections.

Health Officers in this country, and elsewhere, have been brought up, quite rightly, to regard the safe disposal of human excrement as an essential requisite for safeguarding public health. We could justify our action in preventing the use of nightsoil in agriculture, because of the serious risk to health which its use involved.

Health Officers and Sanitary Inspectors have been very active in stopping the supplies of manure so eagerly desired by the Chinese cultivator.

We have sought the co-operation of all educated men and women to insist upon the use of properly constructed latrines by everyone and we have been inclined to regard the installation of a water-carriage system as one of the final aims of civilization.

Though there has been little drama or reward for the Sanitarian in struggling against "the filth diseases," one has, at least the satisfaction of knowing that as a result of these latrine campaigns, a large number of persons have been saved from a miserable and untimely death and the constant drain on the vitality of our people from worm infection is lessening in this country.

What I shall have to say later about "composting," should not be taken as a recommendation to relax those sanitary standards, which are slowly but surely, being built up, with such good effect, throughout Malaya.

PROGRESS IN RURAL SANITATION

In 1925 the International Health Division of the Rockefeller Foundation, in association with the Government of the Straits Settlements, undertook a "Rural Sanitation Campaign" lasting three years. At the conclusion of this campaign, the health authorities concerned, had visited every part of the territories of Singapore, Malacca and Penang. They investigated the incidence of worm infections throughout these areas and undertook the treatment of many thousand persons found to be infected. During this time they organized the construction of sanitary latrines in every village and Government school throughout the land. Doctors Russell and Yaeger, who were the local representatives of the Rockefeller Foundation, also introduced the bore-hole latrine. This has since proved a valuable instrument for securing improvement in rural sanitation. Its value is so much the greater, because it removes all temptation of the illicit use of the contents of the latrine.

* Read at the Annual Meeting of the Malaya Branch, British Medical Association, Kuala Lumpur, 23rd March, 1940.

At the conclusion of the Rural Sanitation Campaign, I happened to be stationed in Penang and it fell to me to follow up the work there, to its logical conclusion. In the administration of Rural Sanitation, it was sometimes necessary to institute proceedings against cultivators who continued to use their own, and other people's faeces in their gardens. Magistrates were not averse to inflict heavy fines upon persons proved guilty of using human ordure as manure. The knowledge that there would be a heavy penalty, coupled with the gradual elimination of supplies, sufficed to stop the practice in town and country places in Penang. This would have had a disastrous effect on local agriculture had it not been for the fact that the gardeners lived mostly near the sea shore, and the alternative of fish manure was available in plenty (though at some extra expense) to make up for this loss. The Chinese are adaptable and thanks to the efforts of the Agricultural Department they were amenable to persuasion. It then became the established practice, wherever possible, to use the sea for dumping refuse, in the hope that fish might thereby thrive and fatten. Surplus fish, not required for human food, would thus in turn, provide a safe source of nourishment for the soil. This plan of using fish manure, sufficed, for a time, to ease my feeling that there must be something wrong in deliberately throwing away a substance which by proper manipulation might safely serve to enrich the land.

It had long been deemed beyond the wit of man to prevent this wastage. The priceless loss of this valuable material has been dramatically likened, by Victor Hugo, the novelist, to a stream of gold flowing to waste along a sewer.

In the Tropics, the dangers of using crude sewage direct upon the land, are far more intense and deadly, than is the case in temperate climate where the risk of worm infection is relatively slight.

An editorial in the Indian Medical Gazette of February, 1934, drew attention to the fact that a method had been found in India to convert village refuse and nightsoil directly into humus. The composting method described in articles by Mielazis, Jackson and Wad, was the Indore System. It was claimed that this method was simple, safe, economical and free from nuisance and that even fly-breeding was abolished.

Such a simple solution for a difficult problem in rural sanitation, seemed too good to be true. It seemed to me, to be beyond the realms of reasonable expectation, that this new method of composting, could readily be adapted to fit the special conditions of Malayan climate and environment. I know now that I was wrong.

At the London School of Hygiene in the Summer of 1937, I had the good fortune to listen to an eloquent talk by Sir Albert Howard on the subject of composting. This information helped to convert me to the view that the Indian methods of composting were scientifically sound and that they should receive an extended trial in Malaya.

On my return to Singapore, in the Autumn of 1937, experiments in the composting of village refuse and nightsoil were begun. These experiments have now gone forward sufficiently to convince me that in composting we possess a means of stimulating agriculture and perhaps even of making the people of Malaya self supporting in vegetable food.

In bringing these investigations to the notice of this Association I wish, in particular, to invite discussion upon the safeguards which may be needed to ensure that the work of composting is so carried out in Malaya as to cause no danger to public health.

THE DEVELOPMENT OF COMPOSTING

Prior to the introduction of composting, by Sir Albert Howard and his co-workers in India in the year 1931, there had been many attempts to render human excrement, or its products, safe and fit for agriculture. All of these, so far as my experience goes, have failed in Malaya, because of the extreme resistance of intestinal worm eggs and amoebic cysts; in only one of these attempts has there been a certain measure of success. Since 1932, the sludge, from the Municipal Sewage Works in Singapore, has been subjected to the heat of 140°F for about half an hour. This heating has been proved by Dr. Gilmour, the Municipal Bacteriologist, to be sufficient to destroy all pathogenic organisms, which may be present in the sludge, including the eggs of intestinal worms. The source of

the heat is derived from the gas evolved in the Imhoff tanks and the process is therefore comparatively inexpensive. The heated sludge, though no longer dangerous, is, however, of poor manurial value, since it is lacking in adequate amounts in nitrogen and potash.

Sludge in Singapore is given away free of charge for those who choose to pay for cartage.

This serves to emphasise the difference in value between the sludge of septic tanks and the crude nightsoil, for which the Chinese gardener is always ready to pay a handsome price.

It also serves to bring into view the great potential value of compost in which every element needed by plants is properly preserved.

Composting as originally propounded by Howard and Wad is a process whereby the waste products of agriculture are converted into humus. In principle it corresponds to the natural process which goes on in the jungle, whereby the residues of plant and animal life are converted into humus, through the agency of fungi and bacteria. Nature's method of dealing with forest wastes, is to convert them into an essential manure for trees, by means of continuous oxidation. The revolution of recent years in the technique of rubber cultivation, by the "forestry method," has been due to modern understanding of this principle.

The Indore composting process, which is based upon the same principle, was first devised for the manufacture of humus from waste products of agriculture. It was later adapted, as I have already said, to serve as a simple solution for the sanitary disposal of the nightsoil and rubbish, carted from towns and villages in India. Further modification of this process resulted in the creation of the Calcutta system of composting, in which the compost is made in brick-lined pits, instead of in mounds or trenches.

In following up this work in Malaya one has to guard against the penalty of allowing enthusiasm or haste to outstrip good sense. There is a painful feeling that one might endanger health by listening too freely to the clamour for manure, added to this there is a natural disinclination to proclaim one's interest in articles so unsavoury as nightsoil and rubbish. Experience shows that these objections can be overcome and I am now satisfied that, with reasonable care, both the Indore Process and the Calcutta System, with very slight and easy modifications, as briefly summarised at the conclusion of this article, can be safely used in Malaya.

I am prepared to prophesy that composting of refuse in our villages, kampongs and estates, will cause a revolution in the sanitary organisation of our rural areas, no less dramatic, and no less beneficial, than has been the case in the change over, from the clean weeding, to forestry methods in rubber cultivation. It is clearly the duty of Health Officers, stimulated, not only by the crying need of improved nutrition amongst the masses, but also, by the special needs of war, to encourage this sanitary revolution and to see that the work is carried out safely and expeditiously.

THE AGRICULTURE ASPECT

The importance of composting is intensified by war conditions.

The war has had a profound effect in hastening the effort which is being made in Rural Singapore to alter sanitary organisation in such a way as to produce the greatest possible amount of compost, as quickly as can be done.

Composting is now being carried out in three large village centres, drawing supplies from about 10,000 inhabitants; yielding approximately three tons of crude compost daily. Arrangements are being made to extend the system.

Meanwhile certain areas of waste land near Health Department Coolie lines have been occupied; over fourteen acres of this land is already being cultivated for the production of vegetables and fruit.

At the beginning it required considerable persuasion to induce the labourers to carry out this work in their spare time, after working hours, without extra pay.

The first of these vegetable and fruit garden allotments, to start cultivation, was begun in the third week of October, 1939; others followed in quick succession. The first crops were gathered in within two months; these consisted mainly of kangkong, spinach and beans. Later, supplies of tomatoes, lettuce, cucumber, radishes, chillies, ground nuts, pumpkins, bringals, ragi, tapioca and sweet

potato began to arrive; and now, within six months of planting a bumper crop of papaya is about to be gathered in.

The produce is shared amongst Health Department labourers. At the present rate of production it is estimated that over 200 of them are saving at the rate of 20 cents a week as a result of their daily ration of vegetables. Thus within months, vegetable production is benefiting the labour force at a rate of over \$2,000 a year. What the increase in health and vitality of the labourers is going to be remains still to be computed.

The cost of composting is no greater than cost of incineration and the capital cost of the compost pit is very considerably less than that of a village incinerator.

The local staff of the Agricultural Department have been closely associated with this work and, but for their cordial assistance, this fine achievement on the part of the coolies could not have been accomplished.

There is evidence on all sides that this development is being watched with growing interest by the villagers, many of whom are now getting busy on their own allotments. The Slogan "For health and Victory—grow your own vegetables and fruit," is finding practical expression in the clamour for more and more supplies of compost by the would-be Chinese and Tamil gardeners. The Eurasian village community, and even the Malays, are joining in this hubbub; there are signs that school teachers are awakening to the possibility of making the local school gardens something more than mere show places. These developments are all of very recent date.

LOCAL EXPERIMENTS IN COMPOSTING

The period of two years, preceding the outbreak of war, was taken up with the study of the methods by which composting of village refuse and nightsoil might be well and safely done. This necessitated tests not only from the chemical, as well as the parasitological standpoint but also involved attention to the aesthetic aspect of the process.

There have been many doubts to overcome and many difficulties and disappointments to face; there are doubtless many more adversities and adversaries to face before one can hope to establish this practice of composting on a firm, self-supporting and healthy basis.

From the parasitological point of view it has been necessary to ascertain the degrees of safety in the various systems which are practicable in this country. Temperature records have been made throughout the testing period and temperature readings are now being taken regularly under practical field conditions. The highest temperature recorded was 168°F and the lowest 142°F; these temperatures are maintained in the compost heaps for at least three weeks, during which time the compost is being turned and all fly maggots living in the surface of the heap are thereby killed. Thus the margin of safety is considerably greater than that which has been proved sufficient in dealing with sludge in Singapore.

It has been determined that the nightsoil used in making compost is literally teeming with ascaris eggs; it is also heavily contaminated with hookworm eggs. By the end of the third week, the compost is free from intestinal worm eggs.

Smell is a factor to be reckoned with, but I find that with increasing experience of the method, this objectionable feature, which is common to all concerns where nightsoil is manipulated, can be reduced to a minimum.

Indeed, I believe that, by seeding the nightsoil pails and buckets with compost, it will be possible to reduce the smell nuisance almost completely. It may, moreover, be possible, by this means, to introduce a saving in the present extravagant use of anti-septic fluids. These are points which must remain for subsequent confirmation. It should be observed however that the presence of either flies or odour in any composting scheme is an indication of defective work. Composting depends for its success upon the elimination of flies and smell.

The chemical results of village composting in Singapore have so far been poor. Nitrogen is recorded at the rate of only 0.73% and Phosphates, in the experimental samples, occur only in negligible amounts. These figures were so disappointing, in comparison with the Indian results, that, in the latter stages

of these preliminary experiments, I was in doubt as to whether it would be worth while continuing an apparently thankless task. I am glad to report that field tests are beginning to show that the purely laboratory approach to the problem was misleading. Either there was something wrong with the sampling or, as now appears more likely, small scale experiments did not suffice to establish the full effects of the chemical process involved in composting. The Agricultural Department in Singapore have now started a field test in their experimental agricultural station. It is confidently expected that these tests will bear out the view that the compost produced on a large scale from village refuse in Singapore is of great manurial value.

The following is a brief summary of two methods of composting village refuse and nightsoil which have so far proved to be practicable and safe under the local conditions prevailing in Malaya.

THE "CALCUTTA" METHOD OF COMPOSTING AS USED IN SINGAPORE

1. A battery of brick-lined trenches, twelve feet long, four feet wide and two feet deep, are constructed. Channels, formed of loose bricks, are so laid, beneath the trenches, as to provide amply for drainage and aeration. (For specification see *Journal of Royal Sanitary Institute*, Vol. LIX, No. 4, October, 1938).

2. An appropriate amount of refuse is dumped daily into successive trenches. One trench may, if necessary, be used for two days supply of refuse. The refuse is sorted; bottles, tins and other incombustible materials are taken out and put on one side for subsequent disposal.

3. The sorted refuse is spread loosely over the surface of the trench. A layer of about six to ten inches is required. The refuse is drawn up towards the side and sloping end of the trench, so as to form a hollow into which the nightsoil is to be dumped.

4. Crude nightsoil (undiluted with water) is poured direct from nightsoil pails on to the layer of refuse. About one gallon of nightsoil is required for each cubic foot of refuse.

5. Immediately after adding the nightsoil, the refuse is thoroughly mixed, using a long rake. The coolie stands on the edge of the trench. The mixture of refuse and nightsoil is then drawn, into a heap to one end of the trench where it is left undisturbed for a week. No watering is done. In very wet weather a loose layer of attaps is used to protect the heap from excessive moisture.

6. At the end of a week (during which time seven other trenches will usually have been similarly filled) the rubbish is turned and is drawn over to the other end of the trench where it is left to mature for two weeks. It is then removed and stacked in a heap on a earth floor, preferably under cover, for a further two weeks, by which time it is ready for use.

Thus, at the end of the fifth week, a continuous daily supply of humus becomes available for agriculture. The whole process, when properly carried out, is free from fly breeding. Maggots may occasionally be observed at the surface of the heap, but these are killed after the first turn. The trenches are so constructed as to prevent the escape of maggots. The average temperature recorded during the first two weeks is at 145°F. At the end of this period the temperature gradually falls to normal. The occurrence of smell, except at the time of dumping nightsoil, is no more than that which is normally associated with an efficient septic tank.

THE "INDORE" METHOD OF COMPOSTING AS USED IN SINGAPORE

1. Well drained land, free from flooding, is suitable for this method of composting. The area required is pegged and levelled. Plots of suitable size are marked out and defined with shallow earth drains.

2. Village refuse is stacked loosely in heaps. These heaps should not be less than six feet wide at the base, four feet high and four feet wide at the top. The volume of a heap 6' x 4' x 4' is reckoned as representing 96

cubic feet of refuse. Glass, tins, coconut husks, stones, and other combustible material are sorted out and put on one side for subsequent disposal.

3. A trench, four feet long, two feet wide and two feet deep, having a cubic content of 16 cubic feet, is dug out in the centre of a heap of the standard size. This trench is filled with well-stirred crude nightsoil. The top of the trench is then covered over loosely with refuse drawn from the side of the heap. The quantity of nightsoil filling the trench should equal about one-sixth (14 per cent.) of the volume of the heap. For ready reckoning each nightsoil pail full represents three gallons; approximately one gallon of nightsoil is added to each cubic foot of refuse.

4. The heap is left undisturbed for a week, except for a daily moistening with about six gallons of water in dry weather. No watering is done during wet weather.

5. At the end of the first week the heap is turned so that the outer portion of the heap becomes the inner and the rubbish inside the heap forms the outer covering. A trench three feet long, two feet wide and two feet deep is dug along the centre of the heap which is by this time reduced to about four-fifths of its original volume. Twelve cubic feet of crude nightsoil (twenty-five nightsoil pails full), equal to about one-tenth of the volume of the standard heap, is added. The top of the trench is then again covered over with drawn refuse. Watering is continued, as before, daily in dry weather.

6. The turning of the compost heap, as described above, is done again at the end of the second week and trenched along the centre. The same quantity of nightsoil is again added.

7. At the end of the third and fourth week, the heap is again turned but no more nightsoil is added. Daily watering is discontinued. The heaps are now left to mature for one month. In the event of heavy rain, a loose covering of grass (lallang) or coconut fronds is laid over the heaps.

Two months from the commencement of composting the heap will have been reduced to almost one-third of its original size. The compost is then fully mature and can be used upon the land. The amount of compost to be used in vegetable cultivation depends upon the condition of the soil. In Singapore the proportion used successfully in cultivated plots has been a mixture of one part of soil to one of humus.

The Indore Method requires no capital outlay on the construction of trenches, as is the case in the Calcutta Method. The Indore method however, necessitates the use of a much greater area of land and calls for much more manipulation. There is therefore a slightly greater recurring cost, though this is found to be no greater than is required for efficient incineration.

The Indore Method is applicable only where the whole supply of nightsoil is available (i.e. in villages or towns where the use of bucket latrines is universal) and where there is an ample supply of well water.

Temperature records in the Indore Method are relatively higher and more prolonged than in the Calcutta System. The temperature reached in the first week averages 160°F and this heat is maintained at a high level (average 150°F) during the first three weeks.

Maggots, which may be seen at the surface of the heap, are destroyed at the first turn and do not reappear. The existence of fly breeding is evidence of inefficiency. Unpleasant odours, except at the time of applying nightsoil, are evidence of inefficient workmanship.

REFERENCES

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- MIELDAZIS, J. J. "Organic Manure from Street Refuse and Nightsoil at Mysore City, India." *Indian Medical Gazette* LXIX, February, 1934.
- HOWARD, SIR ALBERT. "The Manufacture of Humus from the Wastes of Town and Village." *Journal of the Royal Sanitary Institute*, LIX, October, 1938.

(8)

FALKLAND IS. REFORM LEAGUE,
STANLEY,
21st February, 1944.



Sir,
I am instructed by the Committee of the Reform League to ask you to be good enough to consider the following resolution which was passed at a General Meeting, held 15th Feb., 1944.

"That the use of the Sanitary cart which is being used during the day-time, be reverted to night-time as prior to the "Black Out" restriction being imposed".

The objections to day-time disposal of night soil are, the smell and particularly the meeting of butcher's van, milk cart and sanitary cart all at one place.

I am,

Sir,

Yours faithfully,

H. G. Evans
Secretary.

The
Ho. Colonial Secretary,
STANLEY.

Feb. 26/ 1944

Med. Dir.

Sir

I beg to inform you that
I leave the work on the Sanitary
Part as a day work.

Therefore if you think it a night
work I will finish as I don't
intend to go at night.

Jas Branning

No.

MINUTE.

(It is requested that, in any reference to this minute, the above Number and the date may be quoted).

28th February,

19 44.

(12)

From THE SENIOR MEDICAL OFFICER,

To THE HONOURABLE,

THE COLONIAL SECRETARY,

STANLEY.

Stanley, Falkland Islands.

Re:- Labour.

*Discussed
with P. H. O.
who will
deal with the
matter*

William Peck has completed almost one month as Caretaker at the King Edward Memorial Hospital. He has done the essential work but his attitude is unsatisfactory. He informed me to-day that he proposed to work as he considered right and if I was dissatisfied there was plenty of other work waiting for him and he invited me to get some one else. He was not going to kill himself for Government.

Similarly the Sanitary Carter informed me that neither he nor his helper are willing to meet the Reform League's wishes regarding the collection of night soil.

In a recent discussion regarding services rendered my Department by the Public Works Department the Matron drew my attention to what I have observed myself over and over again, namely, that when workers are sent to the hospital to do washing or painting they waste time and a small job may take days to accomplish.

The attitude of all these men arises from the fact that they have nothing to fear and I most respectfully submit that no Department head can secure efficient service to the public as long as this situation is permitted to exist.

h.a.h.



SENIOR MEDICAL OFFICER.

26/44.

29th February,

44.

Sir,

I have the honour to refer to your letter of the 21st February, and to inform you that the Senior Medical Officer and Government are entirely at one with the League in desiring a reversion to the collection of night-soil during the hours of darkness. The only difficulty lies in the fact that, in spite of this expression of public opinion, the Sanitary Carter and his assistant persist in refusing to do the work at night.

2. As the League is aware it has proved difficult to find men willing to do this work. The Sanitary Carter receives a salary of £160 a year plus cost of living bonus. His assistant receives £2. 14s. 0d. a week (including dirt money) plus cost of living bonus, for a 36 hour week. I think you will agree that these emoluments are adequate.

3. If Government insist on these men doing their work at night, it is probable that both will resign. One has already threatened to do so in writing. It will be impossible to replace them and this essential public service will cease for an indefinite period. If the men resign they will, of course, have no difficulty in obtaining other employment.

4. In other countries where this system is in use, the work is done from about 11.0 p.m. onwards and that is when it should be done here, but you will appreciate that this is a situation where Government and the taxpayer are liable to be exploited.

5. I am sending a copy of this letter to the Falkland Islands Labour Federation and would welcome any suggestions for dealing with the matter.

I have the honour to be,
Sir,
Your obedient servant,
K. G. BRADLEY
Colonial Secretary.

The Secretary,
Falkland Islands Reform League,
STANLEY.

28/2/44

1 James St

To

Stanley

Senior medical officer

Sir

I am writing to you about doing the night shift job going Back to night Time if I want to go to a dance or cinema I can't therefore your tied down from everything in winter its not a fit job its nighttime therefore I refuse to do it at night

I am

yours truly
C. J. Skilling

H. C. S.

Passed to you please.

ms
29.2.44

FALKLAND IS. LABOUR FEDERATION,
STANLEY,
27th March, 1944.

Recd 13
Sir,
I am directed by the Committee of the Labour Federation to acknowledge with thanks your letter No. 26/44 (a copy of reply sent to the Reform League) asking for suggestions dealing with this matter.

After careful consideration the Committee appreciate the difficulties as laid down by the Government but would like to suggest that the men employed on this work should be offered an additional ten shillings per week so that the work may be carried out after the hours of daylight.

I am,
Sir,
Yours faithfully,
[Signature]
Secretary.

The
Hon. Colonial Secretary,
STANLEY.

26/44.

(16)

31st March,

44.

Sir,

I have the honour to acknowledge your letter of 27th March regarding the Sanitary Carter. I should very much appreciate an opportunity of discussing this matter with representatives of your Committee at your convenience.

2. As the question now seems to turn to wages I take it that the Reform League will be taking no further action.

I have the honour to be,

Sir,

Your obedient servant,
K. G. BRADLEY
Colonial Secretary.

The Secretary,
Falkland Islands Labour Federation,
STANLEY.



FALKLAND IS. REFORM LEAGUE,
STANLEY,

5th APRIL, 1944,

2 Reg 13
Sir,

with reference to your letter No. 26/41 of the 29th February, 1944 concerning the collection of night-soil, I am instructed by the Committee of the Reform League to inform you that they fully realize the difficulties facing the Government and after a very lengthy discussion at a General Meeting held 28th March 1944 they have decided to place before you some of the various items discussed.

1. It was thought that if the present men employed refused to do the work at night-time, applications for the post may be asked for.
2. The question of higher wages was not considered by the Sanitary Carter, (who accepted the job as night work) when a considerable amount of controversy was caused through the medium of the Church Bulletin, some time back.
3. It was suggested that if this work was to revert back to night-time, the Sanitary Carter could use his own discretion as to when he came out, i.e. Winter nights, say from any time after 6 p.m., and Summer time if he cared to do so from 4 a.m. in the morning, finishing about 8 a.m., this would allow him every night in.
4. Failing any of the foregoing it was thought that a small increase of wages might be considered.

The Committee wish to point out that these are only discussions which took place in connection with your reply and in no way must be regarded as concrete proposals.

Yours faithfully,

H. Evans
Secretary.

The
Hon. Colonial Secretary,

STANLEY.

note. Saw the Secretary who clearly understands (a) that advertisement would be unwise (b) that as the question has now been taken up by the Labour Fed. it has become one of Labour conditions. The F.I.R.L. can have nothing further to do with it.

K. B. 11

FALKLAND IS. LABOUR FEDERATION,
STANLEY,
12th MAY, 1944.

Sir,
with reference to our recent conversation regarding the Sanitary Carter's Assistant, I am instructed by the Committee of the Labour Federation to inform you that after a careful study of the points discussed it was decided to tell the assistant that his wages were considered sufficient, and should the Government require him to work during night time he was expected to do, so.

I am,
Sir,

Yours faithfully,

Heaviside
Secretary.

The
Hon. Colonial Secretary,
STANLEY.



FALKLAND IS. REFORM LEAGUE,
STANLEY,
31st January, 1945.

23

red 8

Sir,
in connection with correspondence dating back to 21st February, 1944 regarding the use of the sanitary cart for night soil during the day-time, I am instructed by the Committee of the Reform League to inform you that the question has again been raised and strongly supported by the Public.

It is suggested that the Government should make every effort to remove this obnoxious nuisance.

Yours faithfully,

W. G. A. S.
Secretary.

The
Hon. Colonial Secretary,
STANLEY.

Ack. by Form letter 31/1/45.

21st February,

45.

Sir,

Red 23 With reference to your letter of the 31st January, I have the honour to inform you that the difficulties in the way of arranging for the collection of night soil during the hours of darkness are connected with labour questions which, as I explained to you on a previous occasion, cannot lie within the province of the Reform League.

2. As your Committee are aware, plans have been prepared for a scheme to facilitate the extension of water borne sewage throughout the town as soon as the necessary materials become available. The success of this scheme, which requires full support of public opinion, will of course provide a permanent solution to our present difficulties, and I am sure that Government can look for your support when the time comes to put it into operation.

I have the honour to be,

Sir,

Your obedient servant,

K. G. BRADLEY

Colonial Secretary.

Secretary,
Falkland Islands Reform League,
STANLEY.

286

STANLEY,
FALKLAND ISLANDS.

WE, the undersigned do hereby strongly support the
FALKLAND ISLANDS REFORM LEAGUE in their request for the removal
of the sanitary cart for daytime disposal of night-soil.

It is our earnest desire to see this most obnoxious pest
freed from the butchers, baker and milkmen, during their daily rounds.

H. B. Duffell	S. D. Hansen
E. Barnes	C. Whitney
M. McMillan	D. J. M. Lead
G. Pearson	A. Sparrow
J. Watts	S. Barnes
L. Rowlands	J. Dwyer
E. McAlister	J. Dwyer
H. B. Duffell	A. H. G. G.
J. A. W. Watts	
J. A. W. Watts	
A. Hansen	
J. Jones	
H. Jennings	
R. Barnes	
J. S. Peterson	
R. Hall	
B. B. Briggs	
W. H. Stewart	
W. P. Hills	
J. Jennings	
E. B. B. B.	
L. Chedden	
A. J. Hannibsen	
A. B. B. B.	

val
t
y rounds.

It is our earnest desire to see this most obnoxious pest freed from the butchers, baker and milkmen, during their daily rounds.

E. Buckle
 M. Luntan.
 P. Lattin
 G. E. Bowler.
 J. G. Baker
 W. G. L. Luntan.
 W. G. Luntan.
 J. M. G. Luntan.
 W. M. G. Luntan.
 W. Luntan.
 J. T. Luntan.
 P. M. Luntan.
 R. Clarke.
 B. H. Luntan.
 D. G. Luntan.
 H. G. Luntan.
 H. J. Luntan.
 James W. Luntan.
 R. A. Luntan.
 L. Luntan.
 H. Luntan.
 H. Luntan.
 J. M. Luntan.
 R. F. Luntan.
 R. J. Luntan.
 R. Luntan.
 R. Luntan.

28.

FALKLAND ISLANDS REFORM LEAGUE,

STANLEY,
13th July, 1945.

Red 27

Sir,
With reference to your letter No.26/44 of the 21st. February, 1945, I am instructed by the Committee of the Reform League to inform you that they are not concerned with the labour problems involved.

With reference to paragraph 2 of your letter, the Reform League welcome the scheme and offer it every support,

The Reform League have, ever since they first communicated with you on the 21st February, 1944,endeavoured to convince you that a public nuisance was being caused, and in support of this allegation a number of the public have forwarded the attached petition.

I am,
Sir,
Yours faithfully,
Hubert
Secretary.

Ack. by form letter 16/7/45.

The Honourable Colonial Secretary,

STANLEY

26/44.

Copy to Medical Officer for inf.
" " Secretary, F.I.L.F. " "

31

28th July,

45.

Sir,

Red 28
With reference to your letter of the 13th July, I am
glad to be able to inform you that arrangements have now been
made for the night-soil to be collected at the following times:-

1st April - 31st August.	Before 8.0 a.m. or after 5.0 p.m. according to daylight.
1st Sept. - 31st March.	At 5.30 a.m.

I have the honour to be,

Sir,

Your obedient servant,

Colonial Secretary.

Secretary,
Falkland Islands Reform League,
STANLEY.