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OUR REF. ST/3/310

YOUR REF.

1st February 1946

Dr. R.Kehoe,
University of Cincinnati,
College of Medicine,
CINCINNATI.

Dear Bob,

I enclose one copy of a report prepared by Dr. Cassells on his recent visit to Falmouth to investigate cases of alleged poisoning amongst personnel employed in tank cleaning operations.

Sincerely yours,
Roy P. Gray

T.R.A. BEVAN

Enc.

See copy of memo and minutes of Petroleum Board about these difficulties in file on letter Tank handling of gasoline United Kingdom

KE 0021513

[redacted] N 24609

TANK-CLEANING AT FALMOUTH

DESCRIPTION OF THE WORK

The tanks to be cleaned were five underground tanks which had contained leaded gasoline. Nos.26, 24, 23 had held 87 octane fuel; No.25 had held 100 octane fuel and No.27 had held 100 and 150 octane fuel.

The tanks were circular - 118 feet diameter x 20 feet high - 4,000 tons capacity, with supporting pillars at intervals. The bottom and sides were of steel with a concrete "lining" along the bottom and for a height of approximately three feet up the walls. The roof was of concrete.

Tank No.23, which I entered, had a manhole 2-ft.10-in. diameter in the roof, which was open, and by which one gained access by means of a perpendicular ladder to the floor of the tank. I understood that there were two manholes in the roof of each tank.

Emptying of the fuel from the tanks was begun on the 16th October 1945, and finished by the 10th November 1945. Cleaning on the first tank (No.26) was begun on the day after it was emptied, but the other tanks had been extracted (by fans in the access chamber sucking through the two 10" mains which had been disconnected in the access chamber) with both manlids open for two weeks before cleaning began.

The procedure in the case of tank No.26 was as follows. On 12th November 1945 the Assistant Supervisor (Mr. Thompson) entered the tank and removed the inverted suction pipe (4" drain) over the sump in order to make room for the rubber tube of the sludge pump, and also put in the lights by which the work was to be carried on. He was in the tank for about an hour and a half, and no one else was in on that day. The men entered the following day wearing white overalls, gum boots and gloves, and equipped with blower-type helmets. The explosimeter gave three NIL readings on this day - 13th November 1945. The blower-type helmets were worn for the first two or three days during which the men cleaned the tank-bottom, using rubber squeegees about 3 feet long and bass bristle brooms.

As much as possible of the water and sludge on the tank bottom was sucked up by the sl udge pump from the water drain to the sump in the access chamber, whence it flowed to the interceptor at the bottom of the site. The men stirred up the sludge with the squeegees and brooms so as to keep it in suspension for the pump to take.

The remainder which the pump couldn't take was swept along in front of each man until there was sufficient to shovel into a bucket with a brass shovel. These buckets, when filled,

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The remainder which the pump couldn't take was swept along in front of each man until there was sufficient to shovel into a bucket with a brass shovel. These buckets, when filled, were emptied into a heap on the floor under the manlid, and when sufficient sludge had accumulated - about 7 to 8 cwts. - it was filled up into buckets, pulled up through the manlid, and buried about 2 feet deep in a trench some distance away.

The men were in the tank for four to five hours each day, and at the end of the day they had a bath provided before changing into their own clothes.

The same cleaning procedure was adopted in the case of

each tank, except that half way through the cleaning of the third tank (No.27) the sludge was siphoned from the water drain to the sump in the access chamber, instead of being pumped, and the sludge was hosed and swept by squeegees into the water drain instead of being brushed. This was done also in the case of Tanks Nos.24 and 23.

Blower type helmets were worn only for the first two days in the first two tanks. After they were discarded civilian type respirators were worn for 2 days and these were replaced later by box respirators, service type, each man having two. One of the men was made responsible for cleaning the face pieces with IZAL at the end of each day.

PERSONNEL.

The following men were engaged in the work for varying periods of time under the supervision of Mr.F.A.THOMPSON:-

[redacted] more or less in charge of the squad from 13th November 1945 until he went off sick on 29th November 1945.

[redacted] was then in charge and also during the absence of Mr.Thompson from 22nd to 27th December, and from 28th December to 7th January 1946.

CLEANING PROGRAMME

The tanks were bottom-cleaned in the following order:- 26, 25, 27, 24, and 23 -

Tank No.26 from 12th to 14th November inclusive, No.25 from 15th to 17th November, No.27 from 19th to 24th November; No.24 from 26th to 29th November.

There was then a gap of a week when the men were not in the tanks, but were working on the valves.

Cleaning re-commenced on Tank No.23 on 5th December, and continued until the present time (8th January 1946) with the exception of Christmas week, when no work was done. The men were working in Tank No.23 at the time of my visit - 7th and 8th January 1946 - being then engaged on scraping the walls. None of the other tanks have as yet been scraped.

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The following men were engaged in the work for varying periods of time under the supervision of Mr. P.A. THOMPSON:-

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Cleaning re-commenced on Tank No.23 on 5th December, and has continued until the present time (8th January 1946) with the exception of Christmas week, when no work was done. The men were still at work in Tank No.23 at the time of my visit - 7th and 8th January 1946 - being then engaged on scraping the walls. None of the other tanks have as yet been scraped.

The length of time spent by each man inside the tanks is given in the accompanying table.

According to statements by some of the men, there was a smell in one or two of the tanks (Nos.26, 25 and possibly 27) variously described as "a smell of spirit", "a smell of octane", "not petrol but a sweet smell, something like a doctor's surgery". One man (SMITH) said that when stirring up the sludge a smell could be felt even through the helmet, and it gave rise to a taste in the mouth "like a poor apple".

Everything seems to have gone well until Drury reported sick on 29th November 1945, followed by Nicholls on the following

er 1945. A statement by Dr.G.E.Wright dated 8th was submitted in the case of [redacted] giving influenzal e cause of his incapacity for work (copy attached). in December, Drury suffered from depression, and l symptoms. He was seen on January 3rd,1946 by an of the Cornwall Mental Hospital, Bodmin, who considered him to be very ill mentally, and recommended his admission as a voluntary patient to the Mental Hospital.

Nicholls stated that his doctor considered he was suffering from "nerves".

I was informed of these circumstances by the Petroleum Board,London, and arranged with Mr.Coles to visit Falmouth on Tuesday, 8th January 1946.

MEDICAL REPORT

1. [redacted] Aged 43 years 3 Melville Road, Falmouth.

History:

:ed tank-cleaning on 13th November 1945 and, being :an, was more or less in charge of the squad under Mr. Thompson.

He spent between 5 and 6 hours daily in the tanks, except Saturdays, when work stopped at 12 noon and he did not work on Sundays. He wore overalls, gumboots, treated gloves, and no headgear. When the gas content was high as shown by the explosimeter, he wore a blower-type helmet - afterwards changing to a service respirator. He states that he worked several times for two hour spells without any respirator at all, and that this happened in more than one tank. Baths were available at the end of each day's work, but he only had "a jolly good wash" because he found the water too cold and the towels too wet.

A week prior to November 28th 1945 his doctor states that he had been sick one evening and stayed away from work the following day. There is no evidence of this absence in the time-table given me by Mr. Thompson. Apart from this he felt quite well, no headaches, no giddiness, appetite good and sleeping well.

On Wednesday, 28th November 1945, he had diarrhoea and vomiting, and some flatulence; he was perspiring and shaking and had difficulty in falling asleep, and spent most of the night talking to his wife and smoking. He was irritable and excitable, and unable to concentrate. He was seen by his doctor on the following day, and thought to be suffering from influenzal gastro enteritis. He spent 4 or 5 days in bed and seemed to improve, although he was still not sleeping well. He couldn't fall asleep until late on in the night, and his sleep was disturbed by dreams: he attributed this happening to the M & B tablets which he was taking for his influenza. His wife states his hands twitched during sleep.

After 4 or 5 days he was sleeping a little better, but still not well. He felt depressed and as though something was pressing on his head. He felt he couldn't join in playing cards as usual with his family.

On one occasion when on his way to see the doctor his wife states his manner was peculiar. He was taking long strides in a great hurry, and his wife had to take his arm as he was unsteady on his feet - "going too quickly for his legs to carry him". He did everything in a great hurry, e.g., undressing for the doctor, and he shouted instead of talking quietly as usual.

One day - 29th December - he suddenly went stiff in his

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One day - 29th December - he suddenly went stiff in his chair and kept saying strange things, and quoting the Scriptures. His wife, who told me this, states that she felt flabbergasted. He was quite normal quarter of an hour later.

He has developed the habit of reading the Bible fairly frequently, and likes to be alone when doing so.

He has lost between 1 and 2 stones weight since 28th November 1945.

On January 2nd 1946 he saw Dr. Stanley Coleman of the Cornwall Mental Hospital, Bodmin, visiting psychiatrist at Truro Infirmary. At this time his wife states he was very nervous.

KE 0021520

described above) and his jaws working. On that
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delusional ideas, and recommended his admission
tal as a voluntary patient, or failing this, by

I examined this man at his home on Tuesday, 8th January 1946.

He was quite co-operative and talked freely. He wore an anxious look, and his face was thin and his eyes rather staring. He was restless while he talked with various purposeless movements of his hands and arms and face muscles, and his articulation was not always clear, as though he couldn't talk quickly enough to keep pace with his thoughts. His colour was good.

His pulse rate was 48 per minute: his temperature 97.2°F.

His blood pressure was 90/55.

The Cranial nerves appeared normal.

The pupillary reflexes were normal. His abdominal reflexes were increased in all segments. His deep reflexes were all present and slightly increased. The plantar responses were flexor.

There was no tremor of the tongue nor of the hands, but hand movements were clumsy, slightly spasmodic.

Muscular power in arms and legs was good.

Muscle tone was also good.

A blood film taken at this time and stained later showed no abnormality.

In conversation, he seemed to me to bear a grudge against his previous employers - The Shell Refining and Marketing Company - and blamed them on several counts:-

(a) He considered he was unfairly treated at Stanlow. On his return from work on the South Coast to Stanlow he felt that he was demoted. He stated that he was formerly a foreman, and when he complained of not getting back his job, he received "an insulting letter" from his manager.

(b) He stated that, without his knowledge, his subsistence

and depression, and delusional ideas, and recommended his admission to the Mental Hospital as a voluntary patient, or failing this, by certification.

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(b) He stated that, without his knowledge, his subsistence allowance was not paid him while working in the South, and he only knew of it when cheques which he gave were returned "Refer to Drawer". One such cheque was sent to a woman who lives within half a mile of his own home and he was upset about what she might think of him. He stated he had to sell furniture to meet the cheques.

(c) He left a car behind in the South when he returned to returned to Stanlow, and in his absence tyres, dynamo, batteries, etc., were stolen from it. He applied to Norman House for petrol coupons to take the car back to Stanlow and was asked for reasons why it was necessary. This disgusted him, since it was his car and the

firm had nothing to do with it, and he didn't reply to the letter.

(d) While on the South Coast job he had to use a car, and was paid only 2¾d. per mile, which did not cover running costs.

He had various other worries:-

(a) He was financially embarrassed due, he states, to unemployment.

(b) He lives in furnished apartments. His own house is let and he can't get the people out.

(c) He accepted a new job and then didn't go to it as promised. He stated that he couldn't raise the fare to go although it was a good job with a weekly wage of £8. to £9.

(d) His daughter's position worries him. She had an illigitimate baby to an American soldier who had promised, he states, to marry her, but was already married. This happening was a great shock to him.

He is quite fond of the baby but is worried that it will have no legal claim to its father's estate in U.S.A.

As regards his dreams, he dreamt that he was in a cage and couldn't get out.

He dreamt again that he was given complete custody of the child. He had one nightmare when he dreamt that all kinds of octopus were trying to catch him. He fought them off, had to chop off some of their tentacles and finally escaped. He woke up very relieved that he had only been dreaming.

He still has difficulty in falling asleep but "is feeling better every day".

He states he has never been ill in his life before except for a touch of rheumatism while at Stanlow.

A sample of urine obtained at this time showed the following when analysed at the Courtauld Institute:

Volume	200 mls.
Mg.lead in sample	.043
Mg.lead per litre	.215
Sp.Gravity	1.014

OPINION:-

This man, so far as we know, was quite well and in good health up to 28th November 1945.

From the 13th to the 28th November his occupation was one in which there is a known toxic (lead) hazard unless precautions are scrupulously observed. According to the man's own statement he disregarded these precautions for a sufficient length of time to make it possible for him to develop toxic symptoms.

Exposure to lead has occurred to the extent that lead is present in a specimen of urine in a concentration of .215 mgms.per litre nearly six weeks after he stopped work.

The nature of his illness on the 28th November 1945 is compatible with tetra ethyl lead poisoning: his condition on the 8th January 1946 was compatible with this diagnosis.

On the other hand, his illness of the 28th November 1945 was diagnosed at that time as influenzal gastro enteritis, and his subsequent manic depressive state attributed to post influenzal depression. His financial and domestic worries may be considered to have aggravated his depression and to have contributed to his present mental illness.

After due consideration I cannot escape the conclusion that he has had the opportunity of contracting tetra ethy lead poisoning - though it is also reasonable to accept that his financial and domestic worries have played a part in determining the nature of his illness.

2. [redacted] Aged 44 years 110, The Terrace, Penryn.

He commenced tank-cleaning on 13th November 1945, and worked on all four tanks (Nos. 26, 25, 27, 24) sludging the bottoms and pulling up the buckets of sludge through the manlid and burying them.

He wore overalls, gum-boots and treated gloves. He wore a blower-type helmet on first entering a tank while the smell of spirit was about. He states he never wore any other type of respirator.

He states that he had itching of the face and nostrils while on the job, and after he went home, and this occurred after helping to carry away the sludge. During the last week he was at work - he reported sick on 30th November 1945 - he felt sick while working. On several occasions he put his fingers down his throat in order to make himself vomit. During this same period of time he had difficulty in falling asleep, and had two or three very restless nights. He felt giddy and unsteady on his feet.

He states that he lost weight fast during the fortnight he was tank-cleaning, and that where he was living he didn't get enough to eat. His appetite was good up to the last week he was working.

He took ill on the 29th November 1945 - felt cold and shivery and had an itching sensation inside the nostrils. He states that his doctor told him he was suffering from "nerves" although he himself says he did not feel nervous in himself while at work, but he fancied he heard sounds - someone talking or someone walking behind him.

He continued to sleep badly for a week or two after stopping work - that is for a month or just over, in all. He had no dreams.

Examination: -

I examined this man on the 8th January 1946

He was quite co-operative and expressed himself as anxious to start work again. He was slow in his speech and did not strike me as a particularly intelligent man.

He told me that he was now feeling fit for work. He was sleeping well: his appetite was good: he was now putting on weight again nicely.

History:

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Examination:-

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He told me that he was now feeling fit for work. He was sleeping well: his appetite was good: he was now putting on weight again nicely.

He occasionally feels an itching inside the nostrils still.

His pulse rate was 63 per minute.

His blood pressure was 135/80.

The Cranial nerves appeared normal.

The pupillary reflexes were normal: his abdominal

reflexes were very brisk in all segments: deep reflexes were normal and the plantar responses were flexor.

There were no tremors. Muscle power and tone were good.

A blood film taken at this time showed no abnormality when later stained.

A sample of urine was taken, and on analysis at the Courtauld Institute, it showed the following:-

Volume	-	175 mls
mg/lead in sample	-	.0415
mg/lead per litre	-	.240
Sp.Gravity	-	1.018 (Mr.S.F.Smith).

His doctor (Dr.Reid, Tregea House, Penzance) informed me by telephone that he considered Nicholls showed an anxiety state when seen at the end of November 1945.

Opinions:-

I consider this man has had a moderate lead intoxication as evidenced by the presence of lead in the urine in a concentration of .240 mgms.per litre nearly six years after his exposure ceased.

His symptoms of nausea and sleeplessness, and his loss in weight and "nerves" are in keeping with this condition.

I considered Nicholls fit to resume work but advised the Supervisor at Falmouth to give him out of door work, where there would be no contact with leaded material. I advised against his resuming tank-cleaning.

I felt that had this man been more intelligent he would have had further information to give as regards his symptoms. I made no attempt to elucidate information by direct questioning, as I should not have known how much credence to give to the answers, but I felt that the little he had to say was trustworthy.

3. [redacted] Aged 32 . Holland Villa, Treverva, Budock.

History:

Commenced tank cleaning 13th November 1945 and was in all four tanks (Nos.26, 25, 27, 24).

He states that in tank 25 he didn't wear a blower-type helmet but only a box respirator, and "that was where the trouble started".

He cleaned out 3 barrow loads of deposit from the sump in the access chamber of tank No.27 using a shovel. He wore no respirator at all while doing this, although "the smell of octane was pretty strong". The fans were running all the time.

What was left in the tank sump was also cleared out by shovelling the sludge into canvas buckets.

While shovelling out the sludge from the sump in the access chamber of tank No.24 wearing no respirators, the smell was strong, so they left it and went to work on the valves outside.

After a week on the valves, work was resumed on Tank 25 for two days, after which he reported sick on Friday, 7th December 1945. He returned to work on Tuesday, 11th December, but did not go back to tank-cleaning.

He states that for the first week or two on the tanks he slept badly. He couldn't fall asleep; when he did sleep it was broken and restless, and he began to have nightmares again. He would wake up with a start or a scream and sweating profusely. He can't remember his dreams.

He used to have nightmares for a time after leaving the sea - he was trapped in the ammunition magazine of a merchant cruiser, and suffered from nerves and loss of memory after this experience; he left the sea in November 1941, and was not allowed to sail again. He had been free of nightmares for at least a year and a half until he began tank-cleaning this time.

On one day after being in a tank (? Tank 24) all morning, he developed a tingling and itching round nose, face, eyes and neck in the afternoon. On the same day he had sourness of the stomach, felt sick but couldn't vomit, and when he went home that night he took salt and water as an emetic. He finally vomited and felt much better. His wife thought he had been drinking because of the smell of his breath - "a putrid smell".

He has not felt ill apart from this day.

His appetite has been good throughout.

History:

Commenced tank cleaning 13th November 1945 and was in all four tanks (Nos.26, 25, 27, 24).

He states that in tank 25 he didn't wear a blower-type helmet but only a box respirator, and "that was where the trouble started".

He cleaned out 3 barrow loads of deposit from the sump in the access chamber of tank No.27 using a shovel. He wore no respirator at all while doing this, although "the smell of octane was pretty strong". The fans were running all the time.

What was left in the tank sump was also cleared out by shovelling the sludge into canvas buckets.

While shovelling out the sludge from the sump in the access chamber of tank No.24 wearing no respirators, the smell was strong, so they left it and went to work on the valves outside.

After a week on the valves, work was resumed on Tank 23 for two days, after which he reported sick on Friday, 7th December 1945. He returned to work on Tuesday, 11th December, but did not go back to tank-cleaning.

He states that for the first week or two on the tanks he slept badly. He couldn't fall asleep; when he did sleep it was broken and restless, and he began to have nightmares again. He would wake up with a start or a scream and sweating profusely. He can't remember his dreams.

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He has not felt ill apart from this day.

His appetite has been good throughout.

He has been sleeping all night again since the end of December - a fortnight after ceasing work on the tanks.

There has been no loss of weight.

Examination:-

He is an alert, intelligent man - not ill. Normal outlook

-operative. He has a good colour.

Is pulse rate was 54 per minute.

Is blood pressure was 115/65.

Cranial nerves appeared normal.

Reflexes were all present and normal. Plantar responses were flexor.

A blood film, stained later, showed no abnormality.

A specimen of urine, analysed in the Courtauld Institute, showed the following:-

Volume	-	179 mls.
Mg/lead in sample	-	.0405
Mg/lead per litre	-	.225
Sp.Gravity	-	1.021. (Mr.E.R.Smith).

He is now quite fit again.

Opinion:-

This man has had a mild lead intoxication as shown by disturbed and difficult sleep and the feeling of nausea.

The concentration of lead in urine - .225 mgm.per litre - one month after all contact with lead has ceased, points to a hazardous exposure having occurred.

He should not be employed on work which involves any exposure to lead, however slight, for at least two months from the date of this report, and then only if the lead concentration of the urine has reached a normal figure.

4. OTHER TANK CLEANERS.

[redacted]: and [redacted] were also engaged in tank-cleaning or were present in the tanks in a supervisory capacity.

Since they experienced either mild symptoms or else none at all, I have grouped them together in my report, and I shall only refer to individuals in cases where symptoms were present, or where working conditions call for comment.

[redacted] and [redacted] have worked in all the tanks from 13th November 1945 up to the present time, with the exception of two weeks, one of which was spent on valves, and one week's holiday during Christmas week.

[redacted] Aged 48 years.

[redacted] had difficulty in falling asleep for about a month. He usually sleeps from 9.30 p.m. to 5.45.a.m. but for this period he wasn't dropping off to sleep 'till some time between midnight and 4.a.m. even when he went to bed as early as 7.30.p.m. which he did with the object of making up for lost sleep. He had dreams but nothing frightening or odd - he usually dreams now and then.

After his week on valves and after Christmas week he began to sleep a lot better, and is now sleeping well again.

After the first two days in Tank No.27 he felt out of sorts - not sleeping, a bad taste in his mouth ("like a poor apple") and a slightly sore throat.

His appetite remained good all the way through and he states that he has lost no weight. He has had no headaches, no giddiness or unsteadiness.

This man is a steady type of workman who would obey orders unquestioningly. He has had experience of lead blending, and in this way he has been examined by me on four previous occasions when his urine was also analysed for lead. I found no difference in his health on clinical examination, but the concentration of lead in the urine was much higher.

A specimen of urine analysed at the Courtauld Institute gave the following results:-

Volume	-	234 mls	
Mg/lead in sample	-	.041	
Mg/lead per litre	-	.175	
Sp.Gravity	-	1.015	(Mr.E.R.Smith).

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Mg/lead per litre	-	.175	
Sp.Gravity	-	1.015	(Mr.E.R.Smith).

A blood film showed no abnormality.

His pulse rate was 63 per minute.

His blood pressure was 105/70.

There was no abnormality of the central nervous system.

Opinion:

This man has had a mild intoxication from which he has

de a good recovery. There would be no objection to continued employment in scraping the tanks whose bottoms have been cleaned, but he should not be employed in bottom-cleaning fresh tanks for at least two months from the date of this report, and only then if the lead concentration of the urine has diminished satisfactorily.

[redacted] Aged 21.

On one occasion while in the first tank (No.26) when pumping in the access chamber - pumping sludge from tank sump to the sump in the access chamber - he did not wear his respirator and felt giddy. He put his mask on quickly and kept it on the whole time after that.

The tank at this time was being exhausted of petrol vapour through the 10" mains which had been disconnected in the access chamber, and there was probably a rather high concentration of petrol vapour in the air.

This experience may have had the beneficial effect of impressing upon him the desirability of wearing his breathing apparatus. Certainly, apart from this temporary giddiness, Jennings appears to have been fit throughout the entire period. His appetite has been good and he has slept well from 10 p.m. to 6 a.m. every day.

He experienced a few dreams - he saw his sister who died a year ago rise up out of her coffin and come back. He remembers, in another dream, fighting with someone who was using the handbasin in a part of the installation where he had no right to be. He doesn't remember any of the other dreams, but none of them was frightening.

His pulse rate was 65 per minute.

His blood pressure was 130/75.

The abdominal reflexes were very brisk in all segments, but the central nervous system showed no other abnormality.

A specimen of urine, analysed at the Courtauld Institute showed the following:-

Volume	-	420 mls
Mg/lead in sample	-	.085
Mg/lead per litre	-	.200
Sp.Gravity		1.024 (Mr. S.H.Smith)

A blood film showed no abnormality.

Opinion:

This man has had exposure to lead as evidenced by the concentration of lead in the urine, but it has not been of sufficient intensity as to give rise to unequivocal symptoms of lead intoxication. He is fit and there is no objection to his coninued employment in scraping the tanks whose bottoms have been cleaned. He should not be employed on cleaning new tanks for at least two months from the date of this report, and then only if the lead concentration of his urine has come within normal limits.

/THER TANK CLEANERS.

[redacted] Aged 50.

[redacted] supervised the cleaning of the tanks, and while present on the site for most of the time, he did not spend as many hours inside the tanks. He was away from the site from 22nd to 27th December and from the 28th December 1945 to 7th January 1946.

He had no symptoms attributable to lead poisoning.

His pulse rate was 87 per minute.

His blood pressure was 135/75.

A blood film showed no abnormality.

A specimen of urine, analysed at the Courtauld Institute, showed the following:-

Volume	-	276 mls.	
Mg/lead in sample	-	.027	
Mg/lead per litre	-	.098	
Sp.Gravity		1.023	(Mr.E.R.Smith)

Opinion:-

[redacted] shows no signs or symptoms of lead intoxication. The concentration of lead in the urine points to exposure to lead, and is just short of the upper limit of safety (0.1 mg.per litre).

The three men [redacted] aged 42; [redacted] aged 21; [redacted] aged 24 have all had a very much short[redacted]k cleani[redacted] Stumbles spent two days on bottom cleaning in Tank No[redacted] had done no bottom cleaning, only scraping.

They were all quite fit on clinical examination.

A sample of urine obtained from J.Hall was analysed at the Courtauld Institute, and showed the following:-

Volume	-	424 mls.	
Mg/lead in sample	-	.0152	
Mg/lead per litre	-	.036	
Sp.Gravity	-	1.010	(Mr.E.R.Smith)

I did not expect to examine as many as nine men, and I had not enough bottles with me to obtain more than seven samples. I consider however that the sample obtained from J.Hall is probably typical for the group in which I have included him.

KE 0021534

SUMMARY:-

[redacted] cleaning at Falmouth four of them certainly, [redacted] nd symptoms of tetra ethyl lead poisoning of a varying degree of intensity.

The exposure of all five to the risk of intoxication by lead is shown by the concentration of lead in the urine on analysi

The two men more severely affected [redacted] show a high lead urinary concentration six weeks after the last known exposure. One man [redacted] moderately affected, shows a similar concentration four weeks after. Two men mildly affected show a slightly less but still high concentration while remaining at work.

DISCUSSION.

It is reasonable to assume that [redacted] and [redacted] had higher urinary lead concentrations at the time they ceased tank-cleaning and that these must have resulted from greater exposure to lead in the course of their work. Further, it would seem that they could only have experienced a greater exposure through neglect of the precautions they were instructed to take, and which they stated they understood (see copy of the form which they signed).

[redacted] states that he [redacted] ct, work without any respirator on several occasions. [redacted] states that he wore nothing else than a blower-type h[redacted]ch appears to mean that he also must have worked without a respirator at times. Also he may not have realised the toxic nature of the sludge which he was pullin up out of the tank and burying, and he may have had some exposure from this. Matthews admits to clearing the sludge out of the sumps into a wheelbarrow without any respirator being worn.

The other two men, [redacted] and [redacted], assert that they never worked without some type of breathing protection at any time (with the exception of the very brief spell admitted to by Jennings when he came giddy). They have experienced only the mildest of symptoms.

It would seem therefore that the incidence and the severity of illness have been more or less in direct proportion to the degree of exposure.

It should be noted that the early symptoms in these cases were similar to those of the men affected at Fareham. Nausea was complained of by two of the men - "felt sick but couldn't vomit" (cf. [redacted]; one of the men put his fingers down his throat and the other took salt and water as an emetic. One of the men began his illness with an attack of gastro enteritis (cf. [redacted] during his week-end at home).

Difficulty in falling asleep was a symptom in four cases, or else sleep was broken and restless and dreaming occurred. Two of the men were more irritable ([redacted]; two of them were anxious enough about themselves to stop work ([redacted] and [redacted] cf. three of the Fareham men).

SUGGESTIONS:

It would seem desirable in the light of these occurrences to have some medical supervision of tank-cleaners wherever operations are being carried out. The doctor concerned should be made aware of the nature of the symptoms, and in this connection it should be emphasised that there are no blood changes, e.g., stippled cells, such as occur in inorganic lead poisoning. The doctor concerned should make himself familiar with the working conditions by entering a tank wearing all the equipment worn by the men.

The men should be medically examined once a week and a record kept of -

Body Weight
Pulse Rate and Temperature
Blood Pressure
Sleep - number of hours and whether well or badly; dreams.
Appetite - any anorexia, nausea, or gastro intestinal upset; number of bowel movements daily; any bad taste.
General Condition - anxiety, nervousness, change in manner, tiredness, feeling of weakness, tremor, pallor.
Analysis of urine for lead should be carried out.

The absence from work of any man should be reported immediately to the doctor; so ought any complaint of illness, however, trivial it may seem, made by any man while at work.

The type of man employed in tank-cleaning should be carefully chosen. He should be a steady workman, of moderate intelligence only who will do what he is told and who will put up with some inconvenience during his work without worrying too much about it. Many men object to wearing an airline mask or a box respirator, or else remove it when supervision is relaxed; others don't mind it and can be trusted to continue wearing it.

The more intelligent type of man may be too imaginative and may feel stifled in a respirator; or he may think that the Management is exaggerating the need for precautions. In both these cases he tends to neglect to do as he is bid.

The unintelligent man is also to be avoided. He may not trouble about the correct fitting of his facepiece or understand that he must replace it if it becomes contaminated; he may continue to wear contaminated clothing; he does not understand the real hazard of his job and calls for more supervision than can be given him.

The foreman in charge should be a man who can be trusted to see that his gang observe all the precautions, who understands that safe working is the first consideration, and who himself sets a good example of this. He should keep careful

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The foreman in charge should be a man who can be trusted to see that his gang observe all the precautions, who understands that safe working is the first consideration, and who himself sets a good example of this. He should keep a careful tally of the hours of use of each box-respirator and see that the face pieces are cleaned daily inside, and that they are replaced if contaminated. He should ensure that clean clothing is available when required, and that the baths are taken.

It should be the duty of the Management to provide clean clothing at suitable intervals and to provide warm baths, soap and clean, dry towels. Bathing should be carried out in Works time, half an hour being allowed for this purpose.

The greatest risk of lead poisoning seems to arise from cleaning the tank-bottoms. During this operation, therefore, air-line masks should be worn, as they should be when cleaning out sumps containing sludge. For the later operations of scraping, box respirators would seem to afford sufficient protection, provided their period of useful life is not exceeded. The samples of scrapings taken from Tank No.23 showed 21 parts per million organic lead and 1.1 mgms. per litre of water in the sample (Mr. E.R. Smith).

Presumably the methods employed in tank-cleaning have received careful consideration by all concerned. It is hoped that this operation will continue to be the subject of study, and that efforts to find means of carrying it out more safely will continue to be made. In the meantime it seems as though safe working can only be achieved at the price of the most careful and thorough supervision - such supervision as may seem out of all proportion to the importance of the type of work, yet which is well worth while if illness of a particularly distressing character is to be avoided.

(Sgd) D.A.K. CASSELLS, M.D.