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OUR REF. 0/ea

YOUR REF.

18th August, 1944.

Dr. R. A. Kehoe,
College of Medicine,
University of Cincinnati,
Ohio, U.S.A.

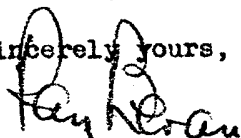
Dear Bob,

For your information and records.
I enclose copy of a letter from Harrison of
Anglo-Iranian, together with Report No.8788
referred to therein.

Hugh Fossett returned to London
last week-end and is preparing a report on his
trip, a copy of which I will send to you as soon
as it is available.

Best wishes,

Sincerely yours,



T. R. A. Bevan.

Original by steamer:
copy with enclosures
by airmail.

COPY OF LETTER

FROM C.A.Harrison,
Anglo-Iranian Oil Company Ltd.
London.

dated 31st July, 1944.

REF. PRO/108

TO: T.R.A. Bevan,
The Associated Ethyl Co.Ltd.
London.

Dear Mr. Bevan,

Lead in Atmosphere Braim Drum Filling Plant

With reference to our conversation with Mr. Laughland, we send herewith for your information and retention, one copy of Abadan Development Report No. 8738 which gives results of lead in atmosphere determinations carried out at the Braim Drum Filling Plant. The following is a relevant extract from Abadan's covering memorandum:-

" This report is the first part of a programme of work on lead poisoning. It was hoped to have additional information before forwarding the present report, results however are not yet available and the preliminary report is therefore sent for your information.

" One test in the five reported shewed a concentration of lead above the permissible maximum but these tests were carried out under the comparatively cool conditions. For the more arduous summer conditions we have arranged :-

- (1) That the men employed in drum filling will work one week in lead contact duties followed by two weeks on lead-free occupations.
- (2) Selected men, 4 from the 5 U.S. gallon drum filling plant and 8 from the large (33 and 42 I.G. drum filling unit) will be submitted each month for lead in urine and clinical tests.
- (3) Lead in atmosphere tests will be carried out as frequently as results demand.

" In due course we will submit reports detailing our findings."

We will arrange to let you have copies of the subsequent reports, referred to above, as they come to hand.

Yours sincerely,

(SIGNED) C. A. Harrison

KE 0010328

WORKS MANAGER

CHEMICAL & DEVELOPMENT DEPT.
ABADAN, 15th March, 1944.

LEAD CONTENT OF THE ATMOSPHERE AT THE
AVIATION SPIRIT FILLING SHEDS

5TH INTERIM REPORT

Requested by: _____ F.E.A. Thompson Esq.

OBJECT:

To determine the lead content of the atmosphere at the Braim drum filling shed.

SUMMARY & CONCLUSION:

1. The air directly above the drums, while they are being filled, contains variable concentrations of lead depending on the wind direction and intensity, but only one of the five tests showed lead content above the accepted limit of 1.5 mg of Pb. per 10 cu.m. of air.
2. Normally the hydrocarbon vapours emerging from the drum are responsible for the lead in the air. Other contributory causes are occasional overflowing of the spirit due to the operator's neglect and a certain amount of spraying around the drum opening at high filling rates.

INTRODUCTION:

The Braim drum filling shed consists of a steel framework and roof with no walls and is surrounded by open space on all sides.

The drum filling equipment as shown in the sketch (fig. 2) consists of an elevated 8 in. pipe through which the spirit flows, and on which are welded at equal intervals short pieces of 2 in. pipes each fitted with a cock that is set to give the desired rate of flow. There are fourteen such points nine of which were in service during the tests mentioned in this report. By lowering and raising a special mechanism attached to the 2 in. pipe the operator starts and stops the flow of the spirit into the drum. A piece of copper tubing connected to a water manometer is inserted in the drum opening and serves as a level indicator. Watching the manometer, the operator can tell when the desired level in the drum is reached.

EXPERIMENTAL:

Lead contents were determined of the air close to one of the filling points at the Braim drum filling shed. Five separate tests were carried out on different days. The sample point was at head height slightly away from the drum in the first two tests (corresponding to the operator's position) and directly above the drum opening in the last three. The exact location of the sample point is shown in the sketch of the shed, Fig. (1), and the results and other particulars of the tests are given in Table 1.

DISCUSSION:

The natural ventilation in the drum filling shed is usually sufficient to make the general atmosphere free from hydrocarbon and T.E.L. vapours. It is only the air immediately above the drums that may contain high concentrations of lead.

The results of tests given in Table 1, together with actual observation of the filling procedure confirm the following statements.

1. High concentrations of lead may occur in the air directly above the drum while it is being filled.
2. Vapours emerging from the drum opening constitute the main source of lead in the air.
3. If the cock on the filling line is opened up to maintain a high filling rate, a certain amount of spraying of the spirit takes place around the drum opening, which adds considerably to the lead content of the air.
4. Occasionally the operator neglects the level indicator and the overflowing spirit contributes further to the lead in the atmosphere.
5. The rate of spillage is very low compared to that in the four gallon can filling and contamination of the general atmosphere because of leaky drums is negligible.

At any rate the worst spot in the shed is at the filling point, and the operative handling the filling mechanism is most likely to be affected. It is believed that frequent change over of men on this job should be sufficient safeguard against serious lead poisoning.

Work by:

F. ASHRAF.

Report by:

F. ASHRAF.

Approved by: W.M. CATCHPOLE

Copy to:-

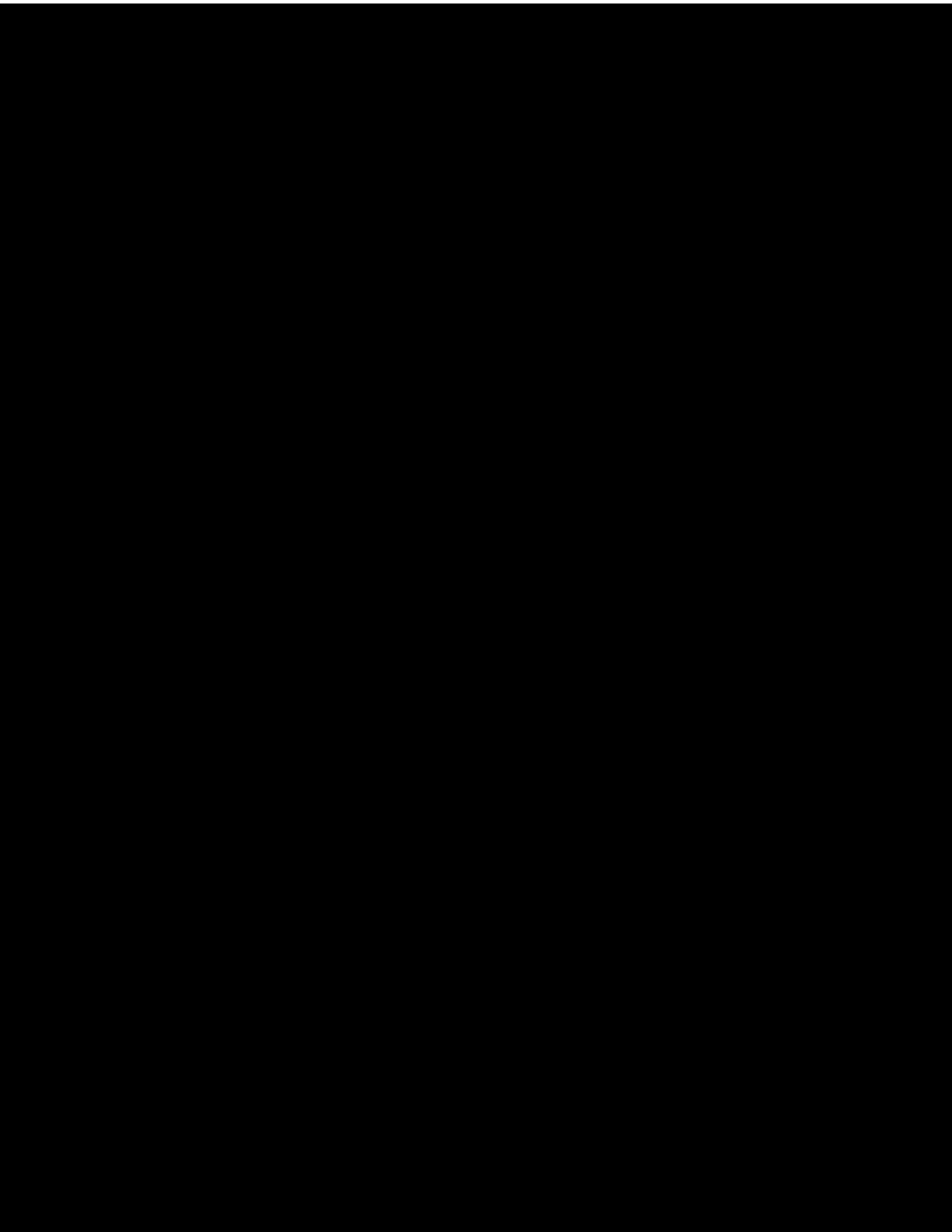
Asst. General Manager (R).
Asst. Works Manager (P).
F.E.A. Thompson Esq.
Supdt. S. & E. Dept. (2)
Senior Medical Officer.

TABLE 1.

LEAD CONTENT OF THE ATMOSPHERE AT BRAIN AVIATION SPIRIT DRUM FILLING SHED.

Test No.	Date	Average Atmos Temperature Of	Prevailing Wind Direction	Average Wind Velocity m.p.h.	T.E.L. Content of the spirit ml./I.G.	Sample Point *	Volume of air litres	ml. St. Pb. solution used	Pb. mg./10 cu.m.
1	21.2.1944	60	W.N.W	4.4	5.4	(1)	136	0.5	0.4
2	22.2.1944	65	W.	4.9	5.4	(1)	70	0.5	0.7
3	28.2.1944	70	N.W.	3.9	5.4	(2)	80	1.0	1.25
4	29.2.1944	70	E.	9.7	4.7	(2)	77	1.0	1.3
5	1.3.1944	75	S.S.E.	5.9	5.4	(2)	93	4.0	4.3

* See Fig. 1 & 2.



File to plant records
abandon

23rd July, 1944

From H. Fossett
To H. W. Rigden, Esq.

APPENDIX A - ETHYL FLUID AND BLENDING.

Temporary Storage Sites.

The layout of the temporary war-time storage facilities is regarded as being excellent and needs no comment other than appreciation of the manner in which a difficult situation has been covered. The question of the maintenance of post-war stocks can only be reviewed in the light of such conditions as may then materialise. I personally feel however that if large stocks of Fluid are to be carried, then the existing sites can form the nucleus of a permanent scheme, after a complete review has been made of the experience which has been gained during the war phase. The whole question of the supply of Fluid to this area in post-war years is of course subject to a number of factors which are indeterminable at the present time.

Frequency of Blending.

It is inevitable that with the high output of leaded spirit blending operations have to take place at frequent intervals. Blending is currently taking place at a frequency of up to 20 times per month. It is noted however that labour is so adjusted that no one man exceeds six blends per month. This procedure is most desirable.

Specific Notes on the three Blending Plants.

New Aviation Area. The blending platform should be surrounded completely with the enclosing curb, to prevent any accidental spillage of fluid passing outside the platform.

3.

A swing joint was leaking and required attention.

The floor was dirty - probably being mainly attributable to the leakage of the U.O.P. inhibitor.

No. 1 eductor suction pipe had been modified by eliminating the normal external co-axial drum flushing nipple and teeing-in the gasoline wash connection to the $\frac{3}{4}$ " fluid suction line. By this means the whole of the outside of the suction pipe is wetted with T.E.L. on immersion in a full barrel, and so the upper end is not washed clean, during the drum flushing operation, since it is not normal practice or necessary to fill the drum with wash gasoline to its full capacity. It was observed that workmen handled this suction pipe on withdrawing it from the barrel midway along its length, so contaminating their gloves unnecessarily. With the standard arrangement the whole length of the outside of the $\frac{3}{4}$ " suction pipe is completely flushed when wash gasoline is run into the drum.

It is understood that this modification was made to enable drums to be evacuated which have tight bungs and have to be drilled. In this connection it is suggested that such drums with tight bungs be segregated and collected in a batch (say of 50 to 100 drums) and the tight bungs be removed by a suitable key attached to an air impact wrench. This equipment will readily remove the tightest bung. The man performing this operation should of course be equipped in full regulation clothing. The bungs may be relubricated with a mixture of graphite in a solution of soap in glycerine - which is insoluble in T.E.L.

It is suggested that this plant be modernised by the installation of a 2-inch eductor and a six point fluid suction manifold. With the existing pumps a rate of education of 25 to 30 drums per hour could be achieved without incurring an excessive T.E.L. concentration in the main circulating line. The T.E.L. concentration in this line would only be 22 to 25 ccs per gallon.

From all points of view it is regarded as advantageous to speed up the rate of blending. Perhaps the most important point is the reduction in the length of time to which the workmen are exposed to the T.E.L. operation.

4.

Consideration might be given to the incorporation of the jet mixing principle in line with an increase in the rate of T.E.L. education.

Motor Benzine Blending Area.

A slight odour of T.E.L. on the platform was traced to leakage in the eductor piping trench. This should be rectified and cleansed.

The Blending Platform floor was rather dirty.

No individual clothes lockers were available, and old equipment, e.g. discarded gloves were being retained.

Blending takes place here with the main circulating pump cracked down to discharge directly through the three eductors. It would be advantageous again to modernize this plant by the installation of an eductor pump (about 150 g.p.m. and 200' head) and a 2 inch eductor and to bled with the circulating pump operating at maximum output - viz. 2000 g.p.m. By this means a 6 point T.E.L. suction manifold could be installed with a consequent reduction in time of blending. Again the jet mixing principle might be considered in connection with this proposal.

If agreed two 2 inch eductors will be supplied free of cost for installation at this plant and also the old Aviation plant with suitable nozzles at throats to give the optimum output.

ETHYL BLENDING - GENERAL.

Supervision - Procedure and "Housekeeping".

In view of the extremely large quantities of T.E.L. being handled at the present time and the likelihood of an increase in the future, there is always a latent tendency for the workmen to become over-familiar with the operation. This is a common and probable failing when large quantities are being handled as a regular practice. The following notes are offered by way of guidance and prevention :-

It has been noted that T.E.L. Blending operators have exhibited high urinary lead excretion figures and such a condition should not arise if meticulous attention is paid to all the details of the standing regulations covering lead blending.

It is suggested that all personnel responsible for supervision should revise from time to time the regulations in force and see that all requirements are faithfully followed. The fact that workmen have exhibited high lead excretion figures can only be taken as being indicative of some, possibly slight but recurrent, irregularity.

I feel that the general standard of housekeeping could be improved - especially in regard to the cleanliness of floors and bathrooms. A psychological standard of cleanliness should be set. Individual metal clothes lockers are essential and these should be kept scrupulously clean and cleared from all unessential equipment - e.g. discarded gloves, swabs etc.

Equipment should be maintained to a similar degree of cleanliness - e.g. drip buckets showing signs of contamination should be discarded and renewed - swing joints - fluid pipe line etc. maintained free from leaks.

Safety procedure should be established as instinctive and not as a set precedent. For example, workmen retiring from the education area and removing gas masks should always move UP wind and not to a set and established locality. Also if T.E.L. vapour is detectable they should resume their masks or move from the area. These observations also apply to the clerk and it is suggested that this man might form one of the subjects forming the physiological control. Workmen should be taught how to handle their gloves correctly - i.e. never to handle the palms or fingers with bare hands but to "wriggle" out of the gloves and then hold them by the insides of the gauntlets. Men should be corrected if they fail to observe such points - by an explanation of the "common sense" angle - and in this connection the psychology of not making a practice of relying on the protective clothing should be stressed - e.g. avoid direct contact of gloves (even if they do protect) with all parts of the equipment which may be contaminated. Always consider the unexpected - e.g. it was observed at the old Aviation Area that drums were not being checked in position.

6.

The criterion to set is to NEVER to see T.E.L. FLUID, never to get a spot of it on protective clothing, and never to smell it.

LABORATORY.

It is necessary for the T.E.L. Reference Fuel Blending burette to be installed in a proper ventilated hood.

The irregular practice of sampling drums for laboratory supplies of T.E.L. is not to be encouraged, but that such supplies should be covered by the forward ordering of litre cans.

ETHYL FLUID STOCKS.

It is desired that all fluid of U.S. origin i.e. Lease Lend supplies, should be used up first since it has been agreed to supply this area very largely from the U.K. on a sterling basis. A gradual conversion of stocks will thus be achieved.

A separate memorandum has been prepared on the properties - dye content etc. of all varieties of fluid which have been supplied from time to time. This note also includes data on the correct maintenance of the standard 100 Octane green colour.