Public Works (1896) Department.

RAILWAY BRANCH.

G.O., No. 168-R

DATED 24th February

Includes memo. 4088 ed. 19.12.95

[Despatch Abstract.]

Petroleums.—Letter to the Government of India forwarding the opinions of the Chemical Examiner, the agents, Madras and South Indian Railways, and of the Consulting Engineer for Railways on the expediency of legislating in regard to paints, varnishes, &c, containing dangerous—, and any fluid of a like description amongst their ingredients.

[P. W. Ry. 1,000—11-8-98.]

Indexed.

BACK PAPERS.

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SERIAL
No. 13

No. 710 R. T.

GOVERNMENT OF INDIA.

PUBLIC WORKS DEPARTMENT.

RAILWAY TRAFFIC.

Calcutta, the 28th November 1895.

The following papers are forwarded to the Local Governments and Administrations and to the Officers noted in the margin, with the request that the Government of India may be furnished with an expression of opinion by the Government of Madras as well as by the railway administrations under the control of the Government of Madras, together with the opinion of the Chemical Analyser concerned, on the expediency of the proposed legislation.

The Governments of Madras, Bombay and Bengal.
The Chief Commissioners of Burma and Assam.
The Resident at Hyderabad.
The Agents to the Governor General in Central India and Rajputana.
The Director General of Railways.
The Consulting Engineers to the Government of India for Railways, Calcutta, Lucknow and Assam.

By order,

Under Secy. to the Govt. of India.

No. 20 Judl.—1441, dated 30th September 1895.

Office memo. from—L. M. THORNTON, Esq., Depy. Secy. to the Govt. of India, Home Dept.,

To—The Secretary to the Government of India, P. W. Dept.

The undersigned is directed to forward to the Public Works Department a copy of the marginally noted correspondence with the Government of Bombay on the question whether the definition of "petroleum" in section 3 (*1*) of the Petroleum Act, XII of 1886, should not be amended so as to include paints, varnishes and similar substances containing dangerous petroleum or any fluid of a like description amongst their ingredients, and to request that, after obtaining the opinions of railway or other companies interested, the Public Works Department will furnish this department with its opinion regarding the expediency of the proposed legislation.

Letter from the Government of Bombay, No. 7448, dated 20th September 1892, and enclosures.
Letter from the Government of Bombay, No. 3467, dated 12th May 1893, and enclosure.
Extract, para. 8, of letter from the Government of Bombay, No. 3722, dated 22nd May 1893.
Extract, para. 3, of letter from the Secretary, Bombay Port Trust, to the Government of Bombay, No. 797, dated 8th March 1893.
Extract, para. 4, of office memorandum by Mr. T. D. Mackenzie, Acting Commissioner of Customs, Salt, Opium and Abkari, Bombay, No. 1397, dated the 16th-17th March 1893.
Letter to the Government of Bombay, No. 266, dated 26th February 1894.
Letter from the Government of Bombay, No. 5803, dated 31st July 1895, and enclosures.
Letter from the Government of Bombay, No. 6122, dated 12th August 1895, and enclosures.

No. 7448, dated 20th September 1892.

From—T. D. MACKENZIE, Esq., I.C.S., Chief Secy. to the Govt. of Bombay,

To—The Secretary to the Government of India, Finance and Commerce Dept.

I am directed to submit, for the consideration and orders of the Government of India, the accompanying copies of the correspondence noted in the margin, and to state, for the reasons mentioned therein, His Excellency the Governor in Council concurs in the proposal made by the Collector of Land Revenue, Customs and Opium, Bombay, and supported by the Commissioner of Customs, Salt, Opium and Abkari, to amend section 3 (1) of the Petroleum Act, 1886, by the insertion therein of the words "or any admixture containing petroleum or compound derived from petroleum" after the

Memorandum from the Commissioner of Customs, Salt, Opium and Abkari, No. 4164, dated 13th August 1891, with accompaniment.
Letter from the Chemical Analyser to Government, No. 1146, dated 30th September 1891.
Memorandum from the Commissioner of Customs, Salt, Opium and Abkari, No. 2588, dated 18th July 1892, with accompaniments.

To The Joint Secy: to the Govt of Madras
5 Spare copies Public Works Department
sent per Packet Post Railway Branch

word "benzine," with a view to prevent the import without a license of mixtures of petroleum which, though dangerous, do not come within the definition of the term "petroleum."

Below endorsement No. 2170 of 9th May 1891, from the Commissioner of Customs, Salt, Opium and Abkari, on Government resolution No. 1470 of 24th April 1891, in the General Department.

Memorandum by the Collector of Land Revenue, Customs and Opium, Bomboy, No. C. 6000, dated 8th August 1891.

The undersigned has the honour to report that the Chemical Analyser seems to him to have somewhat under-estimated the efficiency of the existing provisions of the Petroleum Act.

2. If the petroleum in the case in question had happened to be less than 40 gallons, the prosecution for importing would have failed. At the same time importer would have been forced to take out a license for the petroleum from the Municipal Commissioner. This, in the circumstances of the case, the Municipal Commissioner would have refused. The importer would therefore be unable to bring the petroleum into the town; and unless an arrangement was made for re-shipping the petroleum, it would have been confiscated and destroyed.

3. The second point raised by the Chemical Analyser is that if the importer required it, the provisions and definitions of the Act make it necessary to mix any composition and turn it into the condition in which it would naturally be used. I do not see that the provisions of the Act enforce any such action. It seems to me that if a composition of petroleum in travelling of itself separates into two parts, a safe sediment and a dangerous surface oil, the Customs authorities are not bound to mix or alter the composition. It is their duty to have the surface oil examined, and if it fails to pass the tests, to have the whole consignment detained as dangerous.

4. On the other hand, oil which, until it is distilled, does not flash under 76°F., should, I think, be passed on payment of the ordinary petroleum duty and should not, as at present, have to take out a license. In both cases it seems to me the state of the oil on arrival, without any artificial change or treatment, should be the basis of the decision whether or not the oil is dangerous.

5. I am informed that certain oils are imported which, though dangerous, do not come within the definition of petroleum. To meet the case of such oils, new varieties of which are from time to time introduced, I venture to recommend a suggestion of the Chemical Analyser, namely, that to section 3, para. 1, after the word benzine should be added or "any mixture containing petroleum."

No. 4164, dated 13th August 1891.

Memorandum by the Acting Commissioner of Customs, Salt, Opium and Abkari, Bombay.

Forwarded to Government, with reference to para. 6 of Government resolution in the General Department, No. 1470, dated 27th April last.

2. The importation of less than 40 gallons of dangerous petroleum cannot be prevented under the Act, but Mr. Campbell points out that the Municipal Commissioner would probably refuse a license in cases of the sort referred to.

3. The undersigned concurs in the view taken by the Collector in his thrd paragraph. The Customs authorities are only bound to deal with petroleum compositions in the state in which they are imported, and it is not their duty to remit a dangerous oil with a safe sediment, before testing it for the purposes of the Act.

4. With reference to the suggestion in the Collector's last paragraph, the undersigned thinks it would be well to have enquiries made as to how far dangerous oils not coming under the definition of petroleum are imported.

No. 1146, dated 30th September 1891.

From—Surgeon-Captain T. D. C. Barry, F.R.S.E., F.C.S., F.I.C., Acting Chemical Analyser to the Govt. of Bombay,

To—The Secretary to the Surgeon-General with the Government of Bombay.

With reference to your No. 5595 of the 26th ultimo and accompaniments (herewith returned), I have the honour to state that at the hearing of the case in question it was considered necessary by the Court that the whole contents of the drums should be examined, and that the quantity of absolute petroleum contained therein could alone be taken to represent the measure of the petroleum present. Accordingly the case was referred for re-examination of the contents of the drums under the conditions specified, and upon the result of this re-examination the case was adjudicated.

2. The Collector, in his No. C. 6000, gives expression to an opinion exactly opposed to the opinion and ruling of the Presidency Magistrate in the case under reference.

3. The Commissioner, in his endorsement No. 4164, expresses a similar opinion. If a difference of opinion exists, then, as it certainly did in this case, as to the meaning of the Act, I submit that such a doubt might again arise through what appears to me the somewhat ambiguous wording of this Act; and for this reason I think it might with advantage be re-worded as suggested to the Collector of Customs and quoted by him in his letter under reference.

4. In my opinion the word petroleum, as now used in the Act, can only include the oils described in para. 3, section 1 of the Act. Dangerous petroleum, therefore, by the present wording of the Act, applies only to the same oils and not necessarily to mixtures containing them.

5. Does the power of the Municipal Commissioner to refuse license depend upon local authority or does it apply to all ports where petroleum is landed; and does the refusal rest with the Municipal Commissioner at his own discretion, or could it be overruled by a Court in the event of no authority other than his being found for it?

6. If the power of the Municipal Commissioner to refuse licenses in cases of this kind is absolute, it meets the objection raised by me on that point; but this refusal of license of course entails the proof of dangerous petroleum in the first instance, a proof which would not be forthcoming were the ruling of the Court in any other case the same as on the occasion referred to, when the whole mixture would have passed as non-dangerous petroleum if these had been contained in the whole consignment, say, thirty-nine gallons of absolute petroleum.

No. C. 5666, dated 13th July 1892.

From—J. M. Campbell, Esq., C.S, C.I.E., Collector of Land Revenue, Customs and Opium, Bombay,

To—The Commissioner of Customs, Salt, Opium and Abkari, Bombay.

In returning the papers received with your endorsement No. 388, dated the 22nd January 1892, I have the honour to report as follows.

2. This correspondence, it will be remembered, originated in the remarks on page 14 of the Chemical Analyser's report for 1890. My previous report to the address of your predecessor on those remarks will be found within these papers (memorandum No. C. 6000, dated the 8th August 1891). I have now to deal with the Chemical Analyser's reply to that report in his letter No. 1146, dated the 30th September 1891, to the address of the Surgeon-General.

3. With regard to the test to be applied to mixtures of dangerous petroleum under section 6 of the Act (XII of 1886), it appears to me that I am in substantial agreement with the views of the Court as represented by Dr. Barry. I am of opinion that the quantity of absolute petroleum and not of the total mixture must exceed 40 gallons before import without a license can be forbidden, while, at the same time, I consider that where the oil and other component parts have not of themselves separated, and do not, while in composition, flash under 76° F., it should not be considered necessary to ascertain whether the pure oil, if distilled, would flash at a lower temperature, and thus require a license for importation, etc. Such oil in fact is not dangerous, but there are other mixtures of petroleum which are dangerous; and as I consider that imports of such mixtures should come under the 40-gallon rule, irrespective of the quantity of absolute petroleum which they contain, I suggested an emendation of the Act to effect this. The Chemical Analyser, I am glad to see, agrees with me as to the advisability of such amendment; but in a further letter, No. 257, dated the 16th March 1892 (enclosed), he considers that the amendment would be more complete if it ran as follows:—

"Or any admixture containing petroleum or compound derived from petroleum."

The additional words are intended to meet the case of compounds with oils which cannot be said with perfect certainty to be petroleum itself, and I approve of them. As already suggested, the amendment should be inserted after the word "benzine" in section 3 (*1*).

3. From the reports of my assistant, Mr. Young, and of the Chemical Analyser, herewith forwarded, it will be seen that the advisability of providing some definition of the word inflammable in section 3 has been discussed. No case has yet occurred calling for the amendment of the Act in this respect; and having regard to the views of the Chemical Analyser, I do not recommend that it should be undertaken.

No. 3688, dated 18th July 1892.

Memorandum by the Commissioner of Customs, Salt, Opium and Abkari, Bombay.

Submitted to Government with accompaniments* with reference to endorsement in the Revenue Department, No. 342 of the 16th January last, herewith returned.

* In original, to be returned please.

2. Undersigned agrees with Mr. Campbell and the Chemical Analyser that section 3, para. 1 of Act XII of 1886, might be amended with advantage by inserting after "benzine" the words "or any admixture containing petroleum or compound derived from petroleum."

Below the Commissioner's No. 388, dated 22nd January 1892.

No. C. 584, dated 22nd January 1892.

Endorsement by the Collector of Land Revenue, Customs and Opium, Bombay.

To the Assistant Collector in charge, Prince's Dock, for favour of his remarks on the Chemical Analyser's letter No. 1146, dated 30th September 1891, to the address of the Secretary to the Surgeon-General with the Government of Bombay.

No. 279, dated 6th February 1892.

Memorandum by the Assistant Collector of Customs, Bombay.

With reference to the above, the undersigned begs to report as follows:—

The opinion of the Chemical Analyser, as stated in para. 4 of his letter No. 1146 of 30th September last, that para. 1, section 3, of the Petroleum Act does not necessarily include

mixtures of petroleum with other substances, is supported by the opinion of the Advocate General (*vide* that officer's letter No. 21 of 18th March 1889), where he says: "The question here is whether the mixture is such as practically to be petroleum in spite of the admixture of another fluid." The conviction obtained in the case of Empress *versus* Sharp shows that the Court held that para. 1, section 3, includes mixtures of petroleum and other substances. This goes to prove that there is a diversity of opinion on the subject, and the addition of the words "or any mixtures containing petroleum" after the word "benzine" in para. 1, section 3, of the Petroleum Act as suggested by the Chemical Analyser, will relieve the section of its ambiguous meaning, and include without doubt compounds of petroleum. The undersigned would, however, beg to point out that these additional words will not be sufficient to include, within the definition of petroleum, any inflammable oil (or their compounds) which, though dangerous, cannot be definitely pronounced by the Chemical Analyser to be petroleum, but only as liquids not distinguishable from petroleum (*vide* Chemical Analyser's No. 272 of the 12th March 1889, and the accompanying correspondence).

The next point to which the undersigned would beg to draw the Collector's attention is that a definition should be given of the word "inflammable" in para. 1, section 3, of the Petroleum Act, where petroleum is said to include also the liquids and any inflammable liquid which is made from petroleum. . . . . According to Allen's Commercial Organic Analysis "the inflammability (of petroleum) is of course a function of the volatility, the more volatile constituents taking fire on approach of a flame at any temperature, while the denser and less volatile oils require to be heated considerably before they can be inflamed or made to give off inflammable vapours." Thus, a sample of oil which is a volatile product of petroleum, when heated to even 50° or 60° F., would catch fire on approach of a flame, while another sample of oil, that is also made from petroleum, would not catch fire on approach of a flame even when heated up to 500° F., and it is probable that such heavy oils were not meant by the Legislature to be included under the head of inflammable liquids. The Petroleum Act excludes such oils made from petroleum as have a flashing point of 200° F., and above, but only when used for lubricating purposes. There are, however, other liquids prepared from petroleum of equal or less inflammability not used for lubricating purposes, which are, in the absence of a proper definition of the word "inflammable," liable to the restrictions of the Act. For this reason, it seems necessary to fix the temperature in degree of Fahr. thermometer at or below which liquids prepared from petroleum should be held to be "inflammable," when on being heated they flash at the degree fixed on approach of a flame.

The undersigned thinks it desirable to have the opinion of the Chemical Analyser on both the points suggested above.

No. C. 1382, dated 19th February 1892.

From—J. M. CAMPBELL, Esq., Collector of Land Revenue, Customs and Opium, Bombay,

To—The Chemical Analyser to Government, Bombay.

In forwarding the accompanying copy of a report No. 279 of the 6th instant, from the Assistant Collector, Mr. Young, I have the honour to request the favour of your opinion on the points raised by him.

No. 272, dated 12th March 1889.

From—Brigade-Surgeon I. B. LYON, F.C.S., F.I.C., Chemical Analyser to the Government of Bombay,

To—The Assistant Collector of Customs, in charge, Prince's Dock, Custom House, Bombay.

I have the honour to acknowledge receipt of your letter No. 375 of the 5th instant, and of a drum of turpentine forwarded herewith, bearing a brass label with the words "A. B. Fleming & Co., Oil Rollers and Refiners, London and Edinburgh," on it. The drum also is marked in white N. S. within a diamond.

I have to report that I have examined the liquid contained in the said drum, and I find much of the said liquid to consist of turpentine oil. The liquid, however, I am of opinion, contains in addition to turpentine oil a fluid not distinguishable from one coming under the definition of petroleum as defined in section 3 (*1*) of the Petroleum Act of 1886.

I further find that the liquid contained in the said drum, even when cooled down to a temperature of 50° F., catches fire and burns continuously if a flame be held near it. From this I am of opinion that, could the said liquid be tested with the legal apparatus in the manner directed in the schedule of the Petroleum Act of 1886, its flashing point would be found to be considerably below 50° F.

No. 257, dated 16th March 1892.

From—Surgeon-Captain T. D. C. BARRY, F.R.S.E., F.C.S., F.I.C., Chemical Analyser to the Government of Bombay,

To—The Collector of Land Revenue, Customs and Opium, Bombay.

I have the honour to acknowledge receipt of your No. C.-1382 of the 19th February 1892, and attached correspondence, and with reference thereto to state that I think the objection raised by the Assistant Collector, where he states that this office letter No. 272 of 1889 implies that it cannot be stated definitely that certain inflammable liquids are petroleum, can be met satisfactorily, and if so met, the additional words which I have suggested should be added to the present wording of the Act, would cover every case.

2. The letter under reference was, in my opinion, intended to convey the information that the then Chemical Analyser, though practically certain that petroleum was present, could not absolutely

say so in so many words, because there are no tests laid down for the detection of petroleum. What is the definition of petroleum but "an inflammable liquid," derived from certain sources enumerated or known by certain names specified in the Act? I have no doubt in my own mind but that all these inflammable liquids spoken of *are* petroleum or its derivatives, and the tests and treatment to which suspected petroleum mixtures are now subjected in this laboratory leave no doubt (in my mind at least) that inflammable oils of the nature described can all be comprised under the name of petroleum or its derivatives. Possibly it would render the wording more complete if the following addition were adopted, *viz.*:—

"Or any mixture containing petroleum or compound derived from petroleum."

3. With regard to the second point raised in the letter of the Assistant Collector under reference, I have grave doubts whether the temperature of 76° specified by the Act as the Abel test limit is really applicable to this country. This temperature, I take it, is selected as being above the average temperature in England, and for the purpose of avoiding any accidental firing of the petroleum gas. If I am correct in my surmise as to the reason of adopting this limit of temperature, a sample of petroleum which flashes above 76° being non-dangerous by the Act is still liable to catch fire in a country whose air temperature varies from, say, 68° to 128°, the average being certainly higher than 76.° Of course the higher the limit fixed, the less likely will the petroleum be to catch fire, and also the free ventilation in most godowns will prevent concentration of the gas in anything like a pure state; but the temperature as at present fixed seems to me to be dangerously low. The adoption of a temperature of 80° would, I think, improve matters, but would practically exclude all American oil which usually flashes below 80°, but would allow of the free use of Russian oils which nearly always flash over 80°.

4. I would suggest a temperature of 120° for such oils as are referred to in the Assistant Collector's letter under reference, *viz.*, those used for other than burning and lubricating purposes.

No. C. 2331.

Memorandum by the Collector of Customs, Bombay.

Forwarded to the Assistant Collector in charge Prince's Dock, for favour of any remarks he may have to offer.

No. 1469, dated 30th May 1892.

Memorandum by the Assistant Collector, Prince's Dock, Bombay.

With reference to the above, the undersigned begs to state that if the addition of the words "or any mixture containing petroleum or compound derived from petroleum," after the word "benzine" in section 3 (*1*) of the Petroleum Act of 1886, will include any inflammable oil, which should be classed as petroleum under the head of petroleum, without raising any doubt in the mind of the examining officer, as the Chemical Analyser states would be the case, the undersigned is of opinion that the present Petroleum Act should be so amended.

As regards the point discussed by the Chemical Analyser in the third paragraph of his letter No. 257 of 16th March last, the undersigned begs to state that it was not raised by him in his letter under reference.

The undersigned thinks that 120° F. is too low a temperature to fix for the exclusion from the definition of "inflammable" oils used for other than burning and lubricating purposes. In the case of lubricating oils, the Act fixes the flashing point at 200° F.; but why this point was fixed by the Legislature the undersigned is unable to say. It may be with a view to place as little restriction as possible upon the use of lubricating oils prepared from petroleum in mills. If this be so, then the temperature for other oils other than for burning purposes should be fixed at 250° F., to exclude them from the definition of "inflammable." Or the temperature of oils for lubricating purposes may have been fixed at 200° F. on the grounds that, notwithstanding friction when the machinery is in motion, oils with a flashing point of not less than 200° F., are not liable to become inflammable. If this be so, then 150° F. would not be too high for oils used for other than burning and lubricating purposes.

Memorandum by the Acting First Assistant Collector, Bombay, dated 6th June 1892.

I am respectfully of opinion that the addition proposed by Dr. Barry in section 3 (*1*) is suitable, and seems likely, if made, to obviate the difficulty which has hitherto been experienced in dealing with compositions which contain an admixture of petroleum.

With reference to para. 3 of Dr. Barry's letter, I beg to state that if the Abel test limits were now raised from 76° to 80°, all American oils, as anticipated by the Chemical Analyser, would be practically excluded from this country. I venture to think it very doubtful whether Government would take such a step, no serious difficulty or danger having been experienced by the limits being fixed at 76°.

I agree with Mr. Young in thinking that the temperature of 120° F., suggested by Dr. Barry in the last paragraph of his letter, is somewhat too low to be of any practical use.

No. C. 4939, dated 16th June 1892.

From—J. M. CAMPBELL, Esq., Collector of Land Revenue, Customs and Opium, Bombay,

To—The Chemical Analyser to the Government of Bombay.

Before forwarding the accompanying correspondence to the Commissioner of Customs for submission to Government, I have the honour to draw your attention to the last paragraph of the First Assistant Collector Mr. Young's report, No. 1469, dated 30th May last, and to request the favour of your final opinion and remarks thereon.

mixtures of petroleum with other substances, is supported by the opinion of the Advocate General (*vide* that officer's letter No. 21 of 18th March 1889), where he says: "The question here is whether the mixture is such as practically to be petroleum in spite of the admixture of another fluid." The conviction obtained in the case of Empress *versus* Sharp shows that the Court held that para. 1, section 3, includes mixtures of petroleum and other substances. This goes to prove that there is a diversity of opinion on the subject, and the addition of the words "or any mixtures containing petroleum" after the word "benzine" in para. 1, section 3, of the Petroleum Act as suggested by the Chemical Analyser, will relieve the section of its ambiguous meaning, and include without doubt compounds of petroleum. The undersigned would, however, beg to point out that these additional words will not be sufficient to include, within the definition of petroleum, any inflammable oil (or their compounds) which, though dangerous, cannot be definitely pronounced by the Chemical Analyser to be petroleum, but only as liquids not distinguishable from petroleum (*vide* Chemical Analyser's No. 272 of the 12th March 1889, and the accompanying correspondence).

The next point to which the undersigned would beg to draw the Collector's attention is that a definition should be given of the word "inflammable" in para. 1, section 3, of the Petroleum Act, where petroleum is said to include also the liquids and any inflammable liquid which is made from petroleum. . . . . .According to Allen's Commercial Organic Analysis "the inflammability (of petroleum) is of course a function of the volatility, the more volatile constituents taking fire on approach of a flame at any temperature. while the denser and less volatile oils require to be heated considerably before they can be inflamed or made to give off inflammable vapours." Thus, a sample of oil which is a volatile product of petroleum, when heated to even 50° or 60° F., would catch fire on approach of a flame, while another sample of oil, that is also made from petroleum, would not catch fire on approach of a flame even when heated up to 500° F., and it is probable that such heavy oils were not meant by the Legislature to be included under the head of inflammable liquids. The Petroleum Act excludes such oils made from petroleum as have a flashing point of 200° F., and above, but only when used for lubricating purposes. There are, however, other liquids prepared from petroleum of equal or less inflammability not used for lubricating purposes, which are, in the absence of a proper definition of the word "inflammable," liable to the restrictions of the Act. For this reason, it seems necessary to fix the temperature in degree of Fahr. thermometer at or below which liquids prepared from petroleum should be held to be "inflammable," when on being heated they flash at the degree fixed on approach of a flame.

The undersigned thinks it desirable to have the opinion of the Chemical Analyser on both the points suggested above.

No. C. 1382, dated 19th February 1892.

From—J. M. CAMPBELL, Esq., Collector of Land Revenue, Customs and Opium, Bombay,

To—The Chemical Analyser to Government, Bombay.

In forwarding the accompanying copy of a report No. 279 of the 6th instant, from the Assistant Collector, Mr. Young, I have the honour to request the favour of your opinion on the points raised by him.

No. 272, dated 12th March 1889.

From—Brigade-Surgeon I. B. LYON, F.C.S., F.I.C., Chemical Analyser to the Government of Bombay,

To—The Assistant Collector of Customs, in charge, Prince's Dock, Custom House, Bombay.

I have the honour to acknowledge receipt of your letter No. 375 of the 5th instant, and of a drum of turpentine forwarded herewith, bearing a brass label with the words "A. B. Fleming & Co., Oil Rollers and Refiners, London and Edinburgh," on it. The drum also is marked in white N. S. within a diamond.

I have to report that I have examined the liquid contained in the said drum, and I find much of the said liquid to consist of turpentine oil. The liquid, however, I am of opinion, contains in addition to turpentine oil a fluid not distinguishable from one coming under the definition of petroleum as defined in section 3 (*1*) of the Petroleum Act of 1886.

I further find that the liquid contained in the said drum, even when cooled down to a temperature of 50° F., catches fire and burns continuously if a flame be held near it. From this I am of opinion that, could the said liquid be tested with the legal apparatus in the manner directed in the schedule of the Petroleum Act of 1886, its flashing point would be found to be considerably below 50° F.

No. 257, dated 16th March 1892.

From—Surgeon-Captain T. D. C. BARRY, F.R.S.E., F.C.S., F.I.C., Chemical Analyser to the Government of Bombay,

To—The Collector of Land Revenue, Customs and Opium, Bombay.

I have the honour to acknowledge receipt of your No. C.-1382 of the 19th February 1892, and attached correspondence, and with reference thereto to state that I think the objection raised by the Assistant Collector, where he states that this office letter No. 272 of 1889 implies that it cannot be stated definitely that certain inflammable liquids are petroleum, can be met satisfactorily, and if so met, the additional words which I have suggested should be added to the present wording of the Act, would cover every case.

2. The letter under reference was, in my opinion, intended to convey the information that the then Chemical Analyser, though practically certain that petroleum was present, could not absolutely

say so in so many words, because there are no tests laid down for the detection of petroleum. What is the definition of petroleum but "an inflammable liquid," derived from certain sources enumerated or known by certain names specified in the Act? I have no doubt in my own mind but that all these inflammable liquids spoken of *are* petroleum or its derivatives, and the tests and treatment to which suspected petroleum mixtures are now subjected in this laboratory leave no doubt (in my mind at least) that inflammable oils of the nature described can all be comprised under the name of petroleum or its derivatives. Possibly it would render the wording more complete if the following addition were adopted, *viz.*:—

"Or any mixture containing petroleum or compound derived from petroleum."

3. With regard to the second point raised in the letter of the Assistant Collector under reference, I have grave doubts whether the temperature of 76° specified by the Act as the Abel test limit is really applicable to this country. This temperature, I take it, is selected as being above the average temperature in England, and for the purpose of avoiding any accidental firing of the petroleum gas. If I am correct in my surmise as to the reason of adopting this limit of temperature, a sample of petroleum which flashes above 76° being non-dangerous by the Act is still liable to catch fire in a country whose air temperature varies from, say, 68° to 128°, the average being certainly higher than 76.° Of course the higher the limit fixed, the less likely will the petroleum be to catch fire, and also the free ventilation in most godowns will prevent concentration of the gas in anything like a pure state; but the temperature as at present fixed seems to me to be dangerously low. The adoption of a temperature of 80° would, I think, improve matters, but would practically exclude all American oil which usually flashes below 80°, but would allow of the free use of Russian oils which nearly always flash over 80°.

4. I would suggest a temperature of 120° for such oils as are referred to in the Assistant Collector's letter under reference, *viz.*, those used for other than burning and lubricating purposes.

No. C. 2331.

Memorandum by the Collector of Customs, Bombay.

Forwarded to the Assistant Collector in charge Prince's Dock, for favour of any remarks he may have to offer.

No. 1469, dated 30th May 1892.

Memorandum by the Assistant Collector, Prince's Dock, Bombay.

With reference to the above, the undersigned begs to state that if the addition of the words "or any mixture containing petroleum or compound derived from petroleum," after the word "benzine" in section 3 (*1*) of the Petroleum Act of 1886, will include any inflammable oil, which should be classed as petroleum under the head of petroleum, without raising any doubt in the mind of the examining officer, as the Chemical Analyser states would be the case, the undersigned is of opinion that the present Petroleum Act should be so amended.

As regards the point discussed by the Chemical Analyser in the third paragraph of his letter No. 257 of 16th March last, the undersigned begs to state that it was not raised by him in his letter under reference.

The undersigned thinks that 120° F. is too low a temperature to fix for the exclusion from the definition of "inflammable" oils used for other than burning and lubricating purposes. In the case of lubricating oils, the Act fixes the flashing point at 200° F.; but why this point was fixed by the Legislature the undersigned is unable to say. It may be with a view to place as little restriction as possible upon the use of lubricating oils prepared from petroleum in mills. If this be so, then the temperature for other oils other than for burning purposes should be fixed at 250° F., to exclude them from the definition of "inflammable." Or the temperature of oils for lubricating purposes may have been fixed at 200° F. on the grounds that, notwithstanding friction when the machinery is in motion, oils with a flashing point of not less than 200°F., are not liable to become inflammable. If this be so, then 150° F. would not be too high for oils used for other than burning and lubricating purposes.

Memorandum by the Acting First Assistant Collector, Bombay, dated 6th June 1892.

I am respectfully of opinion that the addition proposed by Dr. Barry in section 3 (*1*) is suitable, and seems likely, if made, to obviate the difficulty which has hitherto been experienced in dealing with compositions which contain an admixture of petro'eum.

With reference to para. 3 of Dr. Barry's letter, I beg to state that if the Abel test limits were now raised from 76° to 80°, all American oils, as anticipated by the Chemical Analyser, would be practically excluded from this country. I venture to think it very doubtful whether Government would take such a step, no serious difficulty or danger having been experienced by the limits being fixed at 76°.

I agree with Mr. Young in thinking that the temperature of 120° F., suggested by Dr. Barry in the last paragraph of his letter, is somewhat too low to be of any practical use.

No. C. 4939. dated 16th June 1892.

From—J. M. CAMPBELL, Esq., Collector of Land Revenue, Customs and Opium, Bombay,

To—The Chemical Analyser to the Government of Bombay.

Before forwarding the accompanying correspondence to the Commissioner of Customs for submission to Government, I have the honour to draw your attention to the last paragraph of the First Assistant Collector Mr. Young's report, No. 1469, dated 30th May last, and to request the favour of your final opinion and remarks thereon.

No. 680, dated 30th January 1892.

From—Surgeon-Captain T. D. C. BARRY, F.R.S.E., F.C.S., F.I.C., Chemical Analyser to the Government of Bombay,

To—The Collector of Land Revenue, Customs and Opium, Bombay.

With reference to your No. C. 4939 of the 17th instant, and attached correspondence (herewith returned), I have the honour to state that when suggesting the temperature of 120° F. for oils used for other than burning and lubricating purposes, I had in mind several cases which have, during the past three years, been coming to my notice, *viz.*, paints and other variously designated compositions (principally used for painting ships) in which petroleum is the solvent used to disolve the solid paint, and with a view to obviate the exclusion of such compositions in which non-dangerous petroleum is used, I suggested the adoption of a temperature of 120° F. I am informed, however, that the duty upon such compositions is extremely light, and has hitherto not checked their importation.

With regard to the present temperature of 200° F. fixed for lubricating oils, I would remark that the flashing point of a *true* lubricating oil is 250° F. and upwards, and according to one authority any "mineral (lubricating) oil flashing below 300° F. is unsafe on account of causing fire," I think that 250° might with advantage be used as the minimum for all oils intended for lubricating purposes, and that it would not prove to be in any way a restriction to the use of such oils in mills.

Finally, I am not of opinion that oil of a minimum flashing point of 150° F. could be used for such purposes as those which I originally contemplated when suggesting a temperature of 120° F., and, as far as I know, these constitute the bulk of compositions in which petroleum other than for lighting and lubricating purposes is used. If, therefore, the fixing of a temperature so low as 120° F. is considered superfluous, I venture to suggest that no provision for such oils be made at all.

No. 3467, dated 12th May 1893.

From- G. W. VIDAL, Esq., I C.S., Acting Chief Secretary to the Govt. of Bombay,

To—The Secretary to the Governme..t of India, Home Dept.

With reference to the correspondence ending with Mr. Melitus's letter No. 78, dated 21st January 1893, stating that the proposal to amend section 3 (*1*) of the Petroleum Act, 1886, is under the consideration of the Government of India, I am directed to forward herewith, for the consideration of that Government, a copy of a memorandum from the Collector of Land Revenue, Customs and Opium, Bombay, No. C. 6366, dated 10th August 1892, and to invite their special attention to the proposal made in para. 1 thereof as to the treatment of mixtures containing petroleum as dangerous or not accordingly as they do or do not flash in their mixed state below the prescribed degree.

No. C. 6366, dated 10th August 1892.

Office memorandum by J. M. CAMPBELL, *Esq., Collector of Land Revenue, Customs and Opium, Bombay.*

The question whether paint or similar substance found to contain dangerous petroleum should all be held dangerous, or such proportion only as corresponds with its dangerous element, is now before Government. The undersigned believes the point has not been decided—*vide* correspondence ending with this office No. 5666 of 13th ultimo. The consideration on which the answer seems to turn is this. In its normal state either at rest or in motion does the paint flash above or below the danger limit (76° F.). The undersigned would suggest that in future when paints, varnishes and similar compositions are found to contain dangerous petroleum, the Chemical Analyser or the Customs Examiners should test two samples, one taken from the composition when at rest, the other after the paint has been stirred. If the result of both tests is a flash over 76°, the composition might pass; if either test flashes under 76°, a license should be required.

2. In the present case the proportion of dangerous petroleum is small (12 per cent.). The paint is for use by the Bombay, Baroda and Central India Railway Company, who will see all care is taken to isolate the paint in transit to Ajmere.

3. In these circumstances, the undersigned would, as a special case, suggest passing the paint without a license. At the same time it is not the experience of the Custom House that dangerous petroleum is required in such paints. In the case of the Peninsular and Oriental Steam Navigation Company and the British India Steam Navigation Company, the importers have undertaken to have no fresh consignments with dangerous ingredients. In fairness to other importers and to prevent avoidable risk to the public, the undersigned would suggest that the Bombay, Baroda and Central India Railway Company be warned against the importation of paint containing dangerous petroleum, and should understand that if they prefer to continue the use of such paint, they must expect the delay and annoyance of waiting for the results of tests, and possibly of taking out a license.

4. In the undersigned's opinion the use of paints containing dangerous petroleum is unnecessary and should be discouraged.

Extract, para. 8, of letter from the Government of Bombay, No. 3722, dated the 22nd May 1893, to the Government of India.

8. In their letter No. 797, dated 8th March 1893, the Trustees of the Port of Bombay raise the question whether naphtha is included in the definition of "petroleum" in section 3 of the Petroleum Act, 1886. It appears to the Commissioner of Customs, Salt, Opium and Abkari, that naphtha, though not specially included in the definition of petroleum in the Act, is, on the showing of the Trustees themselves, in the petroleum class inasmuch as it "is a hydro-carbon" and is also "an

inflammable liquid which is made from petroleum." As the Commissioner reports, the practice in the Customs Department is to regard and treat naphtha, other than wood naphtha, as petroleum, as it must be under the Act. Mr. Mackenzie observes that the point raised by the Trustees is whether naphtha, when imported "as a large constituent in quick-drying paints and all varnishes," should be treated as petroleum. Mr. Mackenzie is disposed to think that if it is proposed to amend the Act, naphtha, if imported as a constituent of paint or varnish, *i.e.*, actually already mixed with paint or vanish, should not be regarded as petroleum, but that if imported separately, with a view to subsequent mixture in India with paint or varnish, there is no reason for not classing and treating it as petroleum In the opinion of the Governor in Council legislation will be required to exclude mineral naphtha from the application of the Act, and as it is not less volatile and inflammable than petroleum, it seems hardly logical to exclude it. Under the orders embodied in the letter from the Department of Finance and Commerce, No. S. 3431 of 20th August 1892, the liability of paints, etc., in which it is an ingredient, to the Customs duty on petroleum under section 21 of the Sea Customs Act, VIII of 1878, is not enforced. The question remains whether the presence of naphtha or petroleum as an ingredient renders them liable to the provisions of the Petroleum Act. It has been held in practice that it does; and paints, varnishes, etc., containing naphtha or petroleum are treated on the analogy of section 21 of the Sea Customs Act as dangerous or not according as the naphtha or petroleum used in their composition is or is not itself dangerous. The suggestion that naphtha should be excluded from the application of the Petroleum Act is probably connected wtth the delay entailed by necessity which thus arises for analysis of the paint with a view to the separation and independent testing of the petreleum ingredient and with the loss occasioned by the rejection of consignments in which dangerous petroleum has been used. In connection with this question, I am to invite attention to my letter No. 3467 of the 12th instant, and to state that, unless there is some practical objection, of which His Excellency in Council is not aware, to the plan suggested by the Collector of Land Revenue, Customs and Opium, Bombay, in his memorandum No. C. 6366, dated 10th August 1892, herewith submitted, *viz.*, that such paints and compositions should be treated as dangerous or not according to their flashing point as imported, without separation of the petroleum ingredient, its adoption would apparently be a sufficient protection to the public and remove all reasonable ground of complaint.

Extract, para. 3, of letter from the Secretary, Bombay Port Trust, to the Government of Bombay, No. 797, dated the 8th March 1893.

3. I am also to enquire if naphtha is included in the definition in clause 3. The Trustees are interested in this, as naphtha is a large constituent in quick-drying paints and all varnishes which are articles of import. Naphtha is a hydro-carbon, and practically belongs to the petroleum class; but in the form referred to it should not, it is suggested, be classed as petroleum.

Extarct, para. 4, of office memorandum by T. D. Mackenzie, Esq., Acting Commissioner of Customs, Salt, Opium and Abkari, Bombay, No. 1397, dated the 16th-17th March 1893.

4. With reference to para. 3 of the letter, it is presumed that by "clause 3," is intended *section 3* of the Petroleum Act, No. XII of 1886, the definition clause of "petroleum." It appears to the undersigned that naphtha, though not specially included in the definition of petroleum in the Act, is, on the showing of the Trustees themselves, in the petroleum class, inasmuch as it is "a hydro-carbon" and is also "an inflammable liquid which is made from petroleum." The practice in the Customs Department is to regard and treat naphtha, other than wood naphtha, as petroleum, as it must be under the Act. The point raised by the Trustees is whether naphtha, when imported "as a large constituent in quick-drying paints and all varnishes," should be treated as petroleum. The Commissioner is disposed to think that if it is proposed to amend the Act, naphtha, if imported as a constituent of paint or varnish,—*i. e.*, actually already mixed with paint or varnish,—should not be regarded as petroleum ; but that if imported separately, with a view to subsequent mixture in India with paint or varnish, there is no reason for not classing and treating it as petroleum.

No. 266, dated 26th February 1894.

From—C. J. LYALL, Esq., C.S.I., C.I.E., Secretary to the Government of India, Home Dept.

To—The Chief Secretary to the Government of Bombay.

I am directed to acknowledge the receipt of your reminders marginally noted, requesting to be furnished with the orders of the Government of India on the matters dealt with in paras. 8 and 9 of your letter No. 3722, dated the 22nd May 1893.

No. 8479, dated the 20th November 1893.
No. 396, dated the 16th January 1894.

2. In para. 8 of your letter of the 22nd May 1893, the questions were discussed (*1*) whether naphtha is included in the definition of "petroleum" in section 3 (*1*) of the Petroleum Act, 1886, and (2) whether paints, varnishes and similar substances containing naphtha or petroleum as an ingredient come wiil in the scope of the Act. With reference to the first question, I am to say that it appears to the Government of India that the definition of "petroleum" in section 3 (*1*) of the Act includes all commercial kinds of naphtha except wood and caoutchouc naphthas. In regard to the second question, I am to say that the Governor General in Council is advised that admixtures, or compounds of petroleum, are of two kinds, *viz.*, (1) mechanical mixtures, such as paints, in which the colouring matter is not in solution, but merely suspended and consequently does not act as a diluent and raise the flashing point of the petroleum with which it is mixed; and (2) compounds with solvents, such as turpentine with which the petroleum combines, so that the flashing point of the compound is different from the flashing point of either of the components. His Excellency in Council is advised that these mixtures and compounds are not petroleum within the meaning of the Act. The petroleum they contain is not in quantities sufficient to give a character to the whole; and

although a fluid (*e.g.*, varnish) of which petroleum formed a part, might come under section 23 of the Act as a fluid "other than petroleum," the Governor General in Council hardly thinks that it could be dealt with under that section unless the ingredients other than petroleum were dangerous.

3. In your letter No. 7448, dated the 20th September 1892, the question was referred whether the definition of "petroleum" in section 3 (1) of the Act should not be added to so as to include "any mixture containing petroleum or compound derived from petroleum." On this point I am to say that, upon the evidence before them, the Government of India do not think that a sufficient case has been made out for undertaking legislation with a view to bring such substances within the scope of the Act. It may be that certain mixtures and compounds, of which petroleum forms an ingredient, are theoretically dangerous, but it has not been proved to the satisfaction of the Government of India that any such mixtures or compounds are actually imported or stored in such quantities or in such a manner as to make them practically a source of danger. In these circumstances, I am to say that, unless some facts can be adduced to show that legislation in the matter is really necessary, the Governor General in Council would be averse from undertaking it.

4. I am to add that the question as to the necessity for raising the minimum flashing point for petroleum stored or carried in bulk, raised in para. 9 of your letter of the 22nd May 1893, was submitted to the Secretary of State with a request that Sir F. Abel's opinion might be obtained on it, and that in the meantime the other Maritime Governments were asked to invite the opinion on the question of experts and of persons interested in the petroleum trade. His Lordship's reply has just been received, and is under the consideration of the Government of India.

No. 5803, dated 31st July 1895.

From—J. MONTEATH, Esq., I.C.S., Acting Secretary to the Government of Bombay,

To—The Secretary to the Government of India, Home Dept.

With reference to para. 3 of your letter No. 266, dated 26th February 1894, I am directed to forward copy of the letter from the Collector of Land Revenue, Customs and Opium, Bombay, specified in the margin and its accompaniments.

No. C.9130, dated 24th June 1895.

2. In the opinion of the Governor in Council these papers clearly demonstrate the dangers which result from the storage and use of some of the modern varieties or paints and varnishes which contain, amongst their ingredients, dangerous petroleum of substances akin to petroleum which in certain circumstances give off a highly inflammable gas and are in themselves easily inflammable. I am to invite special attention to para. 4 of Mr. Campbell's letter and to the interesting report from Mr. Hall, of the Bombay, Baroda and Central India Railway Company. Rise of temperature, the escape of inflammable vapour to the surface, any violent motion or shaking of the receptacle in which the paint or varnish is and various other causes may apparently render a paint or varnish, which seemingly is harmless, a cause of serious danger. The gas when mixed with air will readily explode. In the cases cited by the 1st Assistant Collector of Customs, Government see no reason to doubt that all the explosions were the result of the escape of highly inflammable gases from paints or varnishes.

3. In the opinion of His Excellency in Council it is in the public interest to restrict the importation of paints and varnishes in which dangerous petroleum or any fluid of a like description is an ingredient, and as the use of dangerous petroleum or such fluid is not essential for quick-drying, such restriction would not be an illegitimate interference with any industry. I am therefore to suggest that by an amendment of the Act any composition into which dangerous petroleum or any dangerous fluid akin to petroleum enters should be classed as dangerous petroleum.

No. C. 9130, dated 24th June 1895.

From—J. M. CAMPBELL, Esq., I.C.S., C I.E., Collector of Customs and Opium,

To—The Commissioner of Customs, Salt, Opium and Abkari.

I have the honour to forward a copy of the report from the First Assistant Collector, Prince's Dock, on the points referred to me under Government memorandum No. 502, dated 22nd January 1895.

2. The number of cases of loss of property and danger to life caused by the use of paints and varnishes containing dangerous petroleum is not great. At the same time it is to be remembered that the practice of using dangerous paints is of comparatively recent origin and is still unusual, so that these instances seem to bear a considerable proportion to the whole cases in which such paints and varnishes have been used.

3. For two reasons I venture to think that the use of dangerous petroleum in paints and varnishes should be forbidden—

(1) The use of dangerous petroleum is not necessary. The same object quick-drying, can be obtained by the use of other ingredients.

(2) Paints have hitherto been safe. They are freely handled and are left about among shavings and other combustibles. The use of dangerous paints seems to me a practical evil which should be prevented.

4. In the matter of testing paints supposed to have an element of dangerous petroleum a practical difficulty arises. Though the whole composition may not flash below the legal temperature, it seems possible that from leakage or shaking in travelling, from special heat, or under other conditions, the dangerous ingredient may separate in the form of vapour and the composition be in practice as dangerous as if the whole was dangerous petroleum. In support of this view I would

draw attention to the case of S. S. *Hazel Branch* quoted in para. 8 of Mr. Jehangir's report and to the following remark in para. 6 of the opinion attached to that report:—

"Paints used in the exterior of ships after standing some time throw up the volatile portions to the top. A naked light soon inflames the whole surface, and if in a confined area, a mixture of the vapour and air forms explosive matter which, if ignited, would cause disastrous results."

5. In a case at present under consideration it seems to be the opinion of the legal advisers to Government that the Courts are not likely to admit any composition to be dangerous petroleum unless more than one-half of the whole is dangerous petroleum. For practical purposes this opinion is unsatisfactory. It is plain that the danger in a composition depends not more on the quantity than on the quality of its dangerous element. With a mixture which contains 10 per cent. of petroleum that flashes at 60° F., the danger of accident is much greater than with a mixture which contains 60 per cent. of petroleum that flashes at 70°.

6. For practical purposes it seems to me that a paint or varnish composition in which dangerous petroleum can, with certainty, be detected under chemical analysis is, for the practical purposes of the Petroleum Act, entirely dangerous, and requires the enforcement of as rigid precautions as if it was altogether made of dangerous petroleum.

7. It is no doubt possible that petroleum which is now treated as dangerous might be used without restrictions, and accidents occur in a few cases only. This was known when the Petroleum Act was framed. The chance of accident was held to be ground enough for placing the use of dangerous petroleum under certain restrictions. As it cannot be said that the dangerous element in a paint or varnish could under no condition separate from the other ingredients, I venture to think that the only practical safeguard against the introduction of dangerous paints, varnishes and oils is to treat as dangerous petroleum any composition into which dangerous petroleum enters in even the smallest proportion.

No. 2673, dated 15th June 1895.

Memorandum by JEHANGIR DOSSABOY FRAMJI, *Assistant First Collector of Customs.*

With reference to the above, the undersigned has the honour to explain that the delay which has taken place in the submission of the report called for is chiefly due to the difficulty experienced in obtaining reliable and definite information regarding fires or explosions from the use of inflammable paints.

2. It will be seen that in the first paragraph of the Government memorandum under report the Commissioner is requested to forward to Government the accompaniments to his office memorandum No. 3688, dated 18th July 1892. Copies of these accompaniments the undersigned believes are on the Collector's records.

3. With reference to the concluding portion of para. 1 of the Government memorandum. the undersigned is aware of only one case in which the Collector gave with his report No. C. 1432 of 17th February 1894, which was forwarded to Government, a list of accidents in the Prince's and Victoria Docks from the use of paints containing dangerous petroleum. Extract, para. 4, from the above report is quoted below for ready reference:—

"*Para. 4.*—The accompanying details of three accidents in Prince's Dock from dangerous petroleum paints confirm the position hitherto taken by Government that the use of such paints is attended with serious risk to life and property."

4. The particulars of the three accidents referred to, in extract paragraph quoted above, are as follows:—

"(1) On 26th June 1893 a fire occurred on board the P. and O. Steamer *Shannon* lying at No. 4 berth, Victoria Dock, through some patent paint being ignited in the store room by a naked light used there by the ship's cassab. The damage done to the ship was insignificant. The cassab being badly burnt was removed to hospital where he died from his injuries.

"(2) A fire under exactly similar circumstances, but without fatal results occurred in the same berth on the same vessel on the 13th June 1892.

"(3) On 20th November 1893, a fire occurred on board the S. S. *Arara* lying at No. 15 Shed, Victoria Dock. It is supposed to have originated through one of the hired painters who was engaged to paint the ship having been smoking in the paint locker among naphtha paints under the top gallant forecastle where he had gone to get his supply of paint from. The wooden fittings where the ship's crew live were extensively burnt, the wooden floor of the top gallant forecastle which formed the roof of the crew's quarters as well as some of the iron stringers were considerably burnt and buckled from the heat they were exposed to."

5. Besides the above cases, the undersigned is informed by the Port Officer, Bombay, that on the 14th February 1894, a fire broke out on the S. S. *Australia* moored in the Victoria Dock which was believed to have been caused by spontaneous combustion in the ship's paint locker and store room.

6. Enquiries have also been made of the Municipal authorities, but they have been unable to give information of any fires or explosions which can be traced to the use or storage of inflammable paints and varnishes.

7. It appears that Her Majesty's S. S. *Dotterell* was blown up in the Straits of Magellan about thirteen years ago by an explosion caused by some fast-drying paint on board which was mixed with dangerous petroleum spirit. Another informant says that Xylatine Sicatine is the name of the paint which exploded causing the sinking of Her Majesty's *Dotterell*.

8. The following extract from *Fairplay* of 15th December 1893, gives particulars of a very disastrous accident caused by the use of dangerous paints:—

"The following report of an inquiry at the Marine Board Offices, Port Adelaide, on the 19th September last, into the circumstances attending an explosion on board the S. S. *Hazel Branch* by which the boatswain lost his life, shows the necessity on the part of ship-owners and managers to exercise the greatest care in

he selection of the compounds they put on board for painting purposes, seeing that some of these compounds are capable of giving off gases of a most dangerous description :—

"From the evidence taken it appears that the vessel left Port Adelaide on the 6th September with 139 tons sugar (original cargo) bound for Melbourne, and when in 37·3° S, and 133·5° E. at 2-40 P.M., on the 7th September 1893, during a heavy gale the boatswain went down the chain-locker in the forepeak, where some drums of patent paint were stowed, taking a naked light in order to see whether anything was adrift in the forehole. The composition having leaked had generated a gas, and upon contact with the light an explosion immediately took place, which burst open both bows, smashing the stem, blowing the collision bulkhead into No. 1 hold, and lifting both steel-decks from their side fastenings and doing other considerable damage. The forehold began at once to fill and the vessel to become unmanageable. With great difficulty the master brought the vessel to Port Adelaide, as the gale then blowing was too severe to proceed, arriving there on the 9th September and proceeding into harbour for discharge of cargo and repairs to vessel. The composition not being marked dangerous was not treated as an explosive, and no one board was apparently aware of the dangerous nature of it. The Board are of opinion that the explosion was caused by the leakage of gaseline from drums of anti-fouling composition (thinnings) mixed with the confined air of the forepeak, so causing an explosive mixture which was ignited by the naked flame of a lamp carried by Thomas Gerard, boatswain. The Board find that the explosion was accidental, and that no blame is attachable to the master or officers of the steamer. The Board will recommend the Board of Trade, London, to promulgate a warning to mariners as to the future safe carriage and storage of these and similar compounds, and the proper ventilation of the compartments in which they are carried."

9. A note on the subject of petroleum spirit paints written by Mr. J. W. Hall, of the Bombay Baroda and Central India railway, is appended for the information of the Collector. Special attention is invited to para. 7 of Mr. Hall's note.

Note by Mr. J. W. Hall, of the Bombay, Baroda and Central India railway, on the use of mineral spirits as diluents in paints and varnishes, their danger and scope.

Paint or varnish as made ready for use usually consists of colouring matter, oily fixed, binding medium, and volatile diluent. Colouring matter may vary from heavy mercuric sulphide or lead oxide to the light vegetable blacks of commerce. The fixed oily binding medium of paints usually consists of linseed oil, and in the case of inferior paints a compound consisting of hydro-carbon, oily resins and saponaceous products. With varnishes where transparency is a desideratum, fossil gums fused with pure linseed oil can be the only fixed matter of the compound. In some recent patents, however, oil thickened by means of oxygen generated either by Brin's process or electricity has been used with success, avoiding altogether the use of expensive gums.

2. A good paint or varnish should contain as a diluent pure turpentine only. The resinification of the unevaporated portion ensures perfect drying. No varnish is made with less than 40 per cent. of its volume volatile thinnings. Paint may vary in this respect, but as a rule from 20 to 40 per cent. is the proportion. A paint unless for very rough work could not be used efficiently without a fair proportion of thinnings. These thinnings evaporate immediately on the paint or varnish being laid on, thus ensuring a fixture of the substance without trickling or running down. Hydro-carbons of low boiling point can replace turpentine and other organic spirit for this purpose, but it is only done with a view to cheapen the ultimate product. It would not pay a manufacturer to simply add a small proportion of the whole thinnings; his interests are best served by going the whole hog in this respect. There is, however, another side of this question.

3. The manufacturer of turpentine has a temptation to cheapen his article by the addition of hydro-carbon of mineral origin; his interests are best served by adding just sufficient not to be detected by ordinary means.

4. The paint manufacturer thus, unless on the alert, becomes a victim to the spirit fabricator.

5. Paints or varnishes so made would not find a market unless the mineral spirit was of a very low boiling point. Any thing not distillable in a current of open steam would be worthless, leaving as it would the paint greasy, soft and non-drying.

6. For outside work, such as exterior of ships, buildings, etc., and providing such paints are not stored in close confined places, no harm could come in the use of hydro-carbon, diluted paints or varnishes. When, however, such paints are used in shops or stored in close apartments, they are a positive source of danger. Such paints, after standing some time, throw up the volatile portions to the top. A naked light soon inflames the whole surface, and if in confined area a mixture of the vapour and air forms explosive matter which it would be disastrous to contemplate if ignited.

7. A recent fire at the works of the Great Indian Peninsula Railway Company originated in a store where common paints were kept. The sudden outburst of flame and rapid conflagration of the whole building seemed to indicate an explosion of the character named.

8. During the whole of my experience in railway paint-shops, now extending over 25 years, I have always seen these common ready mixed paints and varnishes carefully avoided. Were it not, many large works would be destroyed by fire, for you cannot guarantee a place where all sorts and conditions of men congregate to be free from risks of ignition.

9. Men will have their pipes, and unless colliery precautions were taken, such paints, I say, cannot be stored and used with safety, no matter how small the proportion of inflammable spirit there may be; 10 per cent. of naphtha in ordinary turpentine will reduce its flash paints twice as many degrees. Turpentine, although not within the scope of the Act, is quite dangerous enough without being tampered with in the manner named: with some pigments it is quite inflammable at ordinary Bombay temperatures, the absorbent matter acting as a wick for the ignition of the paint much in the same manner as cotton tape would do in the case of a fixed oil.

10. In my opinion the restrictions on all kinds of inflammable spirit are not enough. Oils are admitted into India which are positively dangerous in use. Flash points, firing points, etc., as

performed arbitrarily according to legal methods, are misleading. An oil or spirit that will not ignite under 125°F. when tested in the Abel cup, will easily take fire at less than 100°F. when spilled over a large surface. This latter is more like the condition under which such goods are sure to be used, and I take it should be the criterion of safety.

No. 6122, dated 12th August 1895.

From—J. MONTEATH, Esq., I.C.S., Acting Secy. to the Govt. of Bombay, Rev. Dept.,

To—The Secretary to the Government of India, Home Dept.

In continuation of my letter No. 5803, dated 31st July 1895, I am directed to forward herewith copy of a further letter from the Collector of Land Revenue, Customs and Opium, Bombay, No. C. 10694, dated 26th idem, and its accompaniment, furnishing particulars of several accidents resulting from the use of paints and varnishes containing dangerous petroluem noted in the printed report of the Select Committee on petroleum appointed by the House of Commons.

No. 10694 C., dated 26th July 1895.

From—J. M. CAMPBELL, Esq., I.C.S., C.I.E., Collector of Land Revenue, Customs and Opium, Bombay.

To—The Commissioner of Customs, Salt, Opium and Abkari.

I have lately had occasion to read the printed Report from the Select Committee on petroleum appointed by the House of Commons, received from the Under Secretary to Government with his No. 4659, dated 20th June last, in which I find several cases of accidents from the use of paints and varnishes containing dangerous petroleum. Particulars of these accidents as given in the above report are attached, and I beg leave to suggest your sending them on to Government with reference to their memorandum No. 502, dated 22nd January 1895, on which I reported under my No. 9130 C., dated 24th June last.

I have the honour to invite your special attention to case No. 7, the casualty on board ship *Hawarden Castle*—which was due to a paint containing 40 per cent. of naphtha.

No.	Date of accident.	Place.	Circumstances of accident.
1	October 1870 .	Portsmouth Dockyard H. M. S. *Hercules.*	A party of men were lowering a cask of "Hay's patent anti-fouling composition" down the forehold into the carpenter's store room, when the cask fell from the slings and burst, the contents running over the deck. Some men were sent into the store-room to clean the deck, and two lamps, with holes in the upper portion, were being used when, it is supposed, the vapour from the naphtha in the composition coming in contact with the lights, exploded, followed just afterwards by a second explosion, a sheet of flame ascending on each occasion up through the hatch-way to the upper deck. Six men received severe injuries, and three men were slightly injured.
2	6th August 1880	Oldham, Yorkshire .	An explosion occurred in the shop of Mr. Bradford, whose brother went into the cellar with a lighted candle to draw some spirits of varnish from a cask; the candle was placed too near the liquid; an explosion occurred, severely burning the man.
3	26th April 1881 .	Sandy Point, Straits of Magellan, H. M. S. *Dotterel.* This case has been already reported to Government, but this being an official account it is included again in this statement.	H. M. S. *Dotterel* was destroyed while at anchor at Sandy Point in the Straits of Magellan caused by two distinct explosions. The accident was at first attributed to gas evolved from coal stowed in the bunkers, causing an explosion of the gunpowder in the forward magazine. But certain facts having come to light in connection with the accident on board H. M. S. *Triumph* threw doubts on the correctness of the foregoing conclusion, and a further enquiry led to the accident being referred to what was undoubtedly its proper cause, *viz.*, the explosion of the mixture of air with the vapour given off by the "Xerotine Siccative," a (petroleum spirit) drier used in the paint, and this explosion extended to the powder magazine. Eight officers and 143 men lost their lives by the double explosion.

P. W. CURRENT No. 9986

No.	Date of accident.	Place.	Circumstances of accident.
4	22nd November 1881.	Coquimbo, Coast of Chili, H. M. S. *Triumph*.	A remarkable and fatal explosion occurred on Board H. M. S. *Triumph*, due to the ignition of a mixture of air with the vapour from a highly volatile patent "drier" known as "Xerotine Siccative" under the paint room. The introduction of a light into an imperfectly ventilated space containing such a substance necessarily resulted in an explosion, which proved fatal to three seamen, and injured seven others.
5	10th January 1882	Nottingham . .	An explosion which was attributed to gunpowder and paraffin took place on the premises of Mr. Green, causing the collapse of the building, but no loss of life. It subsequently appeared that the explosion was due to some bottles of varnish.
6	30th June 1884 .	Bridge Street, Ballymena, Co. Antrim.	An explosion on the premises of Mr. Graham. Many windows in the vicinity were blown to pieces. Two men injured. The explosion was caused by naphtha or patent driers.
7	3rd July 1884 .	Ship *Hawarden Castle*, at sea.	The vessel had been repainted while at Limerick, and one barrel of the paint used on that occasion, which remained over was stowed away in the lower part of the forepeak. Three of the crew were sent for some gear; two of them stayed at the hatchway to receive it, and one of the men went into the forepeak and struck a match. This was immediately succeeded by a violent explosion which killed the man in the forepeak and severely injured four other men. The Wreck Commissioner's Court found *that the paint contained 40 per cent. of cool naphtha, and evidence was given that one fluid ounce of the paint rendered two cubic feet of air explosive and one gallon would render 320 cubic feet explosive.* The Court stated that the casualty was caused by the explosion of vapour given off from this paint, which had been stowed in the forepeak without any knowledge of its dangerous character: and they considered that it was most desirable that manufacturers of this paint should issue a printed notice drawing attention to the danger arising therefrom. (*N. B.*—This is strictly an obligation arising under section 6 of the Petroleum Act, 1871.)
8	23rd September 1886.	S. S. *Thorndike* (at sea).	Some paint, known as Sisson's anti-corrosive composition, and which consists essentially of coal-tar naphtha mixed with oxide of iron and a little resin, and some solid paraffin, was being used to paint the holds. While some men were engaged in pouring some of the paint from a full cask into an empty one, the boatswain, who was in the hold, had a lighted candle in his hand, and when the operation was about three parts completed, an explosion occurred, and three men were thrown down and severely injured, one of them dying the next day. The Wreck Commissioner's Court found that the accident was due to the explosion of the vapour given off from a cask Sisson's anti-corrosive composition, and expressed the opinion that a notice should be issued with every cask, warning all persons against the danger of opening and emptying the cask in a confined space in which there is a lighted lamp or candle. (*N.B.*—This is strictly an obligation arising under section 6 of the Petroleum Act, 1871.)

J. M. CAMPBELL,
Collector of Land Revenue, Customs and Opium.

G. I. C. P. O.—No. 754 P. W. D.—2-12-95.—500.—J. E. K.

P. W. Current No. 9986

SERIAL No. 14

No. 4058 16/12/95

Copy forwarded to the Agents Madras & S. I. Railways & to the Chemical Examiner for favor of opinion

Remarks No. 4058/1 dy 22.1.96 (Mad)

22/1

Issued 23/1/96

D. 16/12

Circulate all Collectors these periodicals for any remarks

Price 91/1

SERIAL No. 15

CHEMICAL EXAMINER'S OFFICE,

No. 1184

Madras, 17th December 1895.

From

SURGEON-MAJOR J. L. VANGEYZEL, M.B., F.I.C., F.C.S.,

CHEMICAL EXAMINER,

Madras,

To

THE Consulting Engineer for Railways

Madras.

Enclosures.

SIR,

With reference to your No: 4058 dated 16th December 1895 I have the honor to inform you that the Government of Madras having referred the Government of India's Resolution on the expediency of legislating in regard to paints containing dangerous petroleum, my opinion has already been conveyed to them in my letter addressed to the Chief Secretary No: 1174 dated 12th December 1895.

I have the honour to be,
Sir,
Your most obedient Servant,

J L VanGeyzel

M.B., F.I.C., F.C.S.,
Surgeon-Major,
Chemical Examiner.

Arch C.S. for Copy

Free 18/14

[G. 73] P. W. CURRENT No. 523

500—21-10-95.

SERIAL No. 18

Judicial DEPARTMENT,

Fort St. George, 16th January 1896.

OFFICE NOTE No. 106

SERIAL No. 17

From

THE ~~CHIEF~~ Under SECRETARY,

Judicial Department.

To Recd: 18.1.96

THE Joint SECRETARY, to Government,

Public Works DEPARTMENT.

(Railway Branch)

As requested in office note No.4088 C dated 19th December 1895, the undersigned has the honor to forward a copy of the Chemical Examiner's letter No.1174 dated 12th December 1895.

vide SRo case no 58/93

W Francis

Ag.Under Secretary.

Await reply from Madras P.W.D.?

F INDIA.

PARTMENT.

AFFIC.

the Government of Madras,

Works Department, Railway Branch.

Calcutta, the 6th February 1896.

vite your attention to the Govern-

No.710 R.T., dated the 28th November

lon, copies of certain correspond-

mendment of Section 3(1) of the

, so as to include paints, varnishes

ntaining dangerous petroleum or

iption amongst their ingredients,

eply may be expedited.

he honour to be,

Sir,

t obedient servant,

W Bourdillon

Captain, R.E.,

Assistant Secretary.

S.C.B.

P. W. CURRENT No. 1491

Recd: 13. 2. 96

Accompaniment to letter from the Government of Madras, Public Works Department, Railway Branch, No. 68R., dated 24th February 1896.

From the Chemical Examiner, Madras, dated 12th December 1895, No. 1174.

With reference to endorsement No. 2583 of 30th October 1895 (herewith returned as requested) on letter of the Government of India, No. 20 Judicial/1432 of 30th September 1895, I have the honour to state that the dangers resulting from storage of paints and varnishes and other substances containing dangerous petroleum, or substances allied to petroleum, which give off inflammable vapour, have been known for a long time past. The necessity for bringing such paints and varnishes under the Petroleum Act has been demonstrated at Bombay, though, as far as I am aware, it has not been observed that such paints have been imported at the port of Madras. Those importations that have hitherto been tested in this laboratory have not been found to contain "dangerous" volatile ingredients.

2. In order to bring such substances within the operation of the Petroleum Act, it is proposed to amend section 3 (1) of the Petroleum Act of 1886 by adding the words *any mixture containing petroleum or compound derived from petroleum* after the word "benzine." I beg to state that the phrase "compound derived from petroleum" seems to me to be objectionable, inasmuch as it also includes higher hydrocarbon derivatives from petroleum (*e.g.*, solid paraffins, vaseline, &c.), which are by no means "inflammable liquids." A paraffine candle would fall under this definition of "petroleum" since it is a "mixture containing compounds derived from petroleum." If it is not intended to bring such substances as these under restriction, then this phrase is too comprehensive and it would be better to avoid its use.

3. I believe that the wants of the case would be met by omitting the word "and" before the words "any inflammable liquid" in section 3 (1) and by adding, after the words "or from any products of petroleum," one of the following phrases: "and any mixture or compound containing any of these liquids"; or "and any mixture or compound in which any of these liquids forms an ingredient." The amendment in this form would be free from the objection pointed out, and it would cover the case of those mechanical mixtures, such as paints, in which the flashing point of the added "petroleum" is not raised by the presence in them of the solid matter in suspension, as well as the case of those compounds in which the "petroleum" may be so combined with other solvents as to alter the flashing point of the ingredients. The suggested expression "any of these liquids" is intended to include the liquids already specified in section 3 (1) from "rock oil" to "from any products of petroleum."

From the Agent and Manager, Madras Railway, to the Consulting Engineer for Railways, dated Madras, 30th January 1896, No. 8806/85.

With reference to your endorsement No. 4058, dated 16th December 1895, I have the honour to inform you that Government of India Circular No. 710 R.T., dated 28th November 1895, has been circulated among the Executive officers of this railway and that they are unanimous in the opinion that the definition of "petroleum" in section 3 (1) of the Petroleum Act, XII of 1886, should be amended so as to include paints, varnishes and similar substances containing dangerous petroleum, or *any fluid of a like description* amongst their ingredients.

From the Agent, South Indian Railway, to the Consulting Engineer for Railways, dated Trichinopoly, 12th February 1896, No. 123.

With reference to your endorsement No. 4058, dated 16th December 1895, forwarding Government of India letter No. 710 R.T., dated 28th November 1895, I have the honour to inform you that, although no accidents have occurred on this railway in connection with the carriage or storage of paints and varnishes, yet I consider the definition of "petroleum" should be amended to include such paints, varnishes and similar substances as contain dangerous fluids.

I concur in the opinions expressed by the agents that the definition of petroleum should, in the Act of 1886, be so amended as to include paints and varnishes containing dangerous petroleum.

(Signed) F. R. UPCOTT,
Consulting Engineer for Railways.

17th February 1896.

R. Form No. 12.

No. 19

No. 168

Government of Madras.

PUBLIC WORKS DEPARTMENT,

RAILWAY BRANCH.

To

The Secy. to the Govt. of India,

P. W. Department.

Calcutta

24th February 1896

Sir,

With papers
to Government of India
Memorandum dr. 710 R.T.
dy 28 November 1895, I
am directed to forward here-
with the opinions of
the Chemical Examiner,
Agents. Madras & S. & R. Rys &
Consulting Engineer for Rys
on the expediency of legislating
in regard to panels, varnishes
&c containing dangerous
petroleum or any fluid
of a like description and pe-
titions in pursuance to which
the

that the Government
concurs in their opinions
~~therein expressed~~ & recom-
mends the proposed amend-
ment of the Petroleum
Act of 1886.

7 Mch 96

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no: 168 Ry 24.2.96

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