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R. P. LAMONT, Secretary
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FREDERICK M. FEIKER, Director

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TUNG OIL

ECONOMIC AND COMMERCIAL FACTORS IN THE DEVELOPMENT OF A DOMESTIC TUNG OIL INDUSTRY

By

C. C. CONCANNON
Chief, Chemical Division

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FOREWORD

Tung oil has assumed world-wide prominence as an essential raw material. This product, obtained from the seed of a species of tree native to central and southern China, is the best drying and waterproofing oil of vegetable origin known to technical science.

The fact that over 70 per cent of the Chinese annual exportation of tung oil is consumed in the United States demonstrates the progress made by American industries in the employment of this valuable raw material. As high as $15,000,000 a year has been expended by the United States for supplies of tung oil from China.

The business hazards associated with complete dependence upon a single foreign source of supply, reflected in irregularity of supplies, variance in quality, and wide price fluctuations, even before the World War turned the attention of industrial consumers to the prospects of developing domestic production of tung oil. Successful experimental acclimatization and adaptation of the tung tree in the United States resulted in the planting of extended commercial acreage in the Southern States. The present area (aggregating over 25,000 acres) devoted to tung trees represents a substantial foundation from which to develop this promising infant industry.

Establishment of a tung-oil industry in the United States will undoubtedly be a distinct boon to Florida, Mississippi, and the other Gulf States. The planting phase of this industry represents a splendid contribution to the diversification of southern agriculture, providing an economic use for certain waste and uncultivated land and an added channel of activity for labor in that region. In addition, the erection and operation of mills for the commercial expression of the oil may directly amplify industrial activity in the Gulf States and may tend to encourage the movement of paint and varnish and other consuming industries to southern plant locations.

This monograph is therefore dedicated to the sound development of an activity which serves agriculture as well as industry and whose influence affects directly conditions in the South and indirectly business interests throughout the entire country.

FREDERICK M. FEIKER, *Director*,
Bureau of Foreign and Domestic Commerce.

JUNE, 1932.

APPENDIX

A. CHINESE REGULATIONS FOR TESTING TUNG OIL

[To be executed by the Hankow Bureau of Inspection and Testing of Commercial Commodities and other official testing stations. Approved by Ministerial order No. 13939]

1. The following regulations are drawn up in accordance with the provision made in Article II, section 1, and Article XXI for the inspections and testing of commercial commodities.

2. All tung oil to be shipped abroad, for transshipment, for reexport, or for domestic marketing, whether in small containers (baskets, drums, or barrels), or in bulk (steamers or lighters) prior to the sealing of the containers or holds shall be subject to inspection. A blank testing form shall be filled out and the testing fee paid at the Bureau of Inspection and Testing of Commercial Commodities, in accordance with the regulations as set hereunder.

3. When an application has been received, the bureau will immediately send out its officer to take a sample according to the following method:

(*a*) For every shipment of 100 containers, or less than 100 containers, samples of one-half kilo of oil each shall be taken from four containers. For 50 containers or less than 50 containers, samples of 1 kilo of oil each shall be taken from two containers. Any amount over 100 containers shall be counted additionally in proportion.

(*b*) For oil in bulk, one-half kilo of oil shall be taken from each of the three sections, i. e., top, middle, and bottom of the hold.

(*c*) The sample oil thus taken shall be mixed together for a general average sample, out of which 2 kilos of oil shall be taken and placed in four vessels. The sampling officer shall seal and stamp the covers of the vessels, after which one shall be given to the applicant, one used for testing, and the remaining two kept at the bureau for retesting. Any surplus oil shall be returned to the applicant.

(*d*) Samples shall be taken only after the oil has been put in containers or loaded in lighters, and the containers from which samples are taken shall be stamped by the sampling officer.

(*e*) After samples have been taken, the sampling officer shall issue a receipt to the applicant.

4. The required standards for tung oil to be exported abroad are as follows:

Item	Maximum	Minimum
Appearance	Pale and clear.	
Specific gravity at 15.5° C	0.943	0.940
Acid number	8	
Saponification number	195	190
Refractive index at 25° C.[1]	1.520	1.5165
Iodine number (Wijs)		163
Heating test, test tube (minutes)	12	
Worstall's test (minutes)[2]	7½	

[1] The minimum refractive index for tung oil exported to Europe and Australia shall be 1.5150.
[2] The cake should be dry and firm, and should crumble under pressure of spatula without sticking.

5. The testing of tung oil shall be completed within two days after the sample has been taken, Sunday and holidays excepted. In case of emergency, special arrangements may be made.

6. After the testing of tung oil, a certificate or an analytical report shall be issued to the applicant in exchange for the sampling receipt.

7. The tung-oil certificate issued to the applicant shall be effective for six months.

8. When the tung oil has been found to pass the required specifications, each hold of the lighter or steamer and each container shall be stamped where the oil has been sealed.

9. In shipping oil from A port to B port, if the oil has passed the required specifications at Bureau A, it shall be exempt from further testing by Bureau B, but the original certificate shall be presented at Bureau B, for identification and indorsement; otherwise the oil shall be subject to a retesting according to Article XIX of the Provisional Regulations for the Inspection and Testing of Commercial Commodities.

10. The inspection and testing fee for tung oil shall be at the rate of 10 cents (Chinese dollar currency) per picul. The number of piculs shall be based on the weight as set down by the customs for duty. The testing fee shall not be returned, whether the oil passes the required specifications or not.

11. Retesting of the oil shall be allowed within six months at the request of the applicant or buyer.

B. THE ORIENTAL OILS ASSOCIATION RULES FOR TRADING

The Oriental Oils Association includes in its membership the principal American importers of tung oil. It is considered, therefore, that trading rules governing a large share of the United States import trade in this commodity should be of interest to tung-oil buyers and industrial consumers.

RULE 1

SECTION 1. All sales of China wood oil by members of The Oriental Oils Association shall be made under a written contract embodying the rules of The Oriental Oils Association, signed by both buyer and seller.

RULE 2.—QUALITY

SECTION 1. The standard of quality shall be pure China wood oil of fair merchantable quality according to season's production at time and place of shipment.

SEC. 2. Moisture up to twenty-hundredths of 1 per cent is tolerable without allowance. Moisture up to 1 per cent can not be rejected, but allowance shall be made by seller for such moisture in excess of twenty-hundredths of 1 per cent at double the contract price, plus one-half of 1 per cent of the contract price. Moisture in excess of 1 per cent entitles buyer to reject delivery.

SEC. 3. Purity of oil is to be evidenced by certificate issued by the laboratories of either Robert A. Worstall, Charles V. Bacon, Curtis & Tompkins (Ltd.), or Laucks Laboratories (Inc.), determination to be made in accordance with the methods prescribed by the American Society for Testing Materials Tentative Standards of 1929 (p. 271–278), which cover all except moisture. For moisture determination, the Dean-Starke distillation method shall be used.

SEC. 4. Buyer shall have the right to call for reanalysis by authorized chemist of the Oriental Oils Association. Should second analysis confirm the first, the result shall be final. Should there be a disagreement in results, then a third chemist of the association shall make the final analysis. All analyses shall be based on samples drawn at time and point of shipment. All referee analysis expenses shall be paid for by the party at fault.

SEC. 5. Nothing contained in these rules shall prohibit the sale of special grades of China wood oil (at special prices), but the general terms and conditions and a signed contract embodying these rules shall apply to such sales.

RULE 3.—SAMPLES

SECTION 1. Sampling shall be done only by recognized samplers and/or inspectors. Unless stated to the contrary, the cost of sampling shall be for account of the seller. The buyer shall have the option of having a representative present at time of sampling. Official sampler shall draw one sample, to be divided into three parts, one to be submitted to the chemist for analysis, the remaining two to be retained under seal for 90 days.

SEC. 2. Sampling shall be from 10 per cent of packages, and samples shall be taken with a clean glass thief of sufficient length to secure a full core sample. The point of the thief should rest on the inside of the package opposite the bung opening. The contents of packages shall be well agitated by the sampler prior to sampling.

SEC. 3. Samples of oil in tank cars shall be taken by thief vertically through the entire core in the center toward each end of the tank car within eight hours of the time tank cars complete loading.

SEC. 4. All samples shall be marked plainly for identification, stating quantity of the parcel (or tank-car number), number of packages sampled, barrel numbers sampled, method used, commodity, place, time, date, weather, by whom sampled, marks and range numbers, and any other specific data that special cases may require.

SEC. 5. All samples shall be sealed in such manner as to preclude any possibility of removing the cap without breaking the seal. At least 1 gallon must be drawn, and may subsequently be thoroughly mixed and distributed as desired. At least three 1-quart samples of each shipment shall be sealed.

SEC. 6. Only new, clean, 1-quart cans shall be used for official samples.

SEC. 7. All samplers shall retain a 1-quart sample for a period of at least 90 days.

RULE 4.—WEIGHTS

SECTION 1. Weighing under these rules shall be done only by recognized public weighmasters, approved or licensed by their local organizations. Weight certificates shall show package or tank-car numbers; shipping marks; gross, tare, and net weights; date and location of weighing; and such certificates shall be final.

SEC. 2. Weights at point of shipment in the United States are to be understood as governing transactions.

SEC. 3. Weights of tank cars are understood to be based on public weighmaster's certificate of Transcontinental Freight Bureau weights at the Pacific coast and railway track scale weights or hopper scale at other points. Tank cars shall be free and uncoupled at each end when being weighed.

SEC. 4. Landed weights shall be understood to be weights taken after discharge from vessel and within five days after tender has been made. All packages are to be in sound condition prior to weighing.

SEC. 5. Cost of weighing shall be for account of the seller. The buyer shall have the option of having a representative present to check the weights. The buyer may demand reweighing of oil purchased ex dock or ex warehouse if weight certificates are dated more than five days prior to time of tender.

RULE 5.—TARES

SECTION 1. Tares of oil in packages shall be the original marked invoice tare. In the event of tares being illegible, weighmasters may have access to the original weight certificate to determine the correct tare.

SEC. 2. The buyers or sellers shall be entitled to demand the stripping of 10 per cent of the packages, provided there be justification for believing tares to be excessive. The seller shall make allowance to the buyer for excess of supertares on the following basis: Wood barrels if exceeding 4 pounds per barrel; steel or iron drums, if exceeding 1 pound per package.

SEC. 3. Any claim for excess tares must be made within 15 days after delivery. The actual tares of packages must be ascertained by removing the head and draining and wiping out the package thoroughly. The stripping must be done in a warm place. The seller has the option of having a representative present during the operation. The cost of stripping shall be at the expense of the party making the demand.

SEC. 4. The tares of tank cars shall be the actual weight of the empty tank car after being certified as clean.

RULE 6.—TENDERS

SECTION 1. If delivery or shipment is at seller's option within a stipulated period, seller may demand of buyer, upon seven days' notice, buyer's requirements and shipping instructions. If buyer fails to furnish seller with such requirements and shipping instructions at the expiration of this seven days' notice, seller may cancel contract or sell the merchandise for buyer's account, upon 48 hours' notice, holding the buyer for difference in value and all expenses.

SEC. 2. When a rejection is left uncontested by seller or is sustained as a result of arbitration, seller shall have the original contract period within which to tender other lots.

SEC. 3. Where oil is sold for shipment or delivery during a certain period, shipment shall be understood to be at seller's option unless stipulated to the contrary.

SEC. 4. Settlement of contracts shall be based on 375 pounds net per barrel. Tank cars of 60,000-gallon capacity, 45,000 pounds; 80,000-gallon capacity, 60,000 pounds; 10,000-gallon capacity, 75,000 pounds. Other packages based on the custom of the trade.

SEC. 5. When contracts are written "about," or "more or less," or words to that effect, the weight franchise shall be understood to be 5 per cent more or less at seller's option. Any excess or deficiency greater than 2 per cent shall be settled for at the market price or contract price at time of shipment at buyer's option.

SEC. 6. Any excess freight charges assessed by transportation company because of deficient loading of cars are for the account of seller.

RULE 7.—DELIVERIES

SECTION 1. Contracts for imported merchandise are based on United States tariff, customhouse, and railway classification in force at time of sale. Any change in such classification before delivery or the imposition or change in duty or government tax or freight rates shall be for buyer's account.

SEC. 2. Each delivery on account of contract shall be treated as a separate contract, except that if either party becomes insolvent, all deliveries called for in the contract may be closed out at fair market price at the option of the solvent party, on due notice.

SEC. 3. Deliveries ex dock or ex warehouse New York shall be understood to be within the free lighterage limits of the port of New York. Oil sold ex dock or ex warehouse is, unless stipulated to the contrary, at the risk of buyer as soon as warehouse receipt or delivery order is accepted by buyer.

SEC. 4. When oil is sold f. o. b., the official date stamped by the originating railroad on the bill of lading shall be considered the date of shipment. Notwithstanding shipped to seller's order, goods sold f. o. b. cars are at the risk of buyer from and after delivery to carrier at point of shipment and upon issuance of documents by carrier.

SEC. 5. Seller shall present documents covering shipment to the buyer prior to the arrival of shipment at buyer's destination. Should the merchandise reach destination before receipt of documents by buyer, seller shall be responsible for demurrage, car rentals, storage, and other charges resulting therefrom.

SEC. 6. If seller agrees to postpone delivery of any portion of oil beyond the 15th of the month succeeding the month specified for delivery and acceptance thereof, the price of such oil shall be increased by the addition of $0.001 per pound for each month or fraction thereof (after the month specified for delivery and acceptance) that delivery is so postponed.

RULE 8.—CASUALTY CLAUSE

SECTION 1. In all cases seller shall not be responsible for nondelivery or delay of delivery resulting from the acts of God, from the elements, or from the action of governments, or caused by strikes, fires, explosions, floods, war, riots insurrections or civil commotions, lockouts, perils of the sea, embargoes. contingencies in the course of oversea voyage or overland transportation. *Provided*, That seller must prove the direct operation of any alleged disabling circumstances and must notify buyer of the existence of such circumstances as soon as known to him.

RULE 9.—PAYMENT

SECTION 1. The terms of payment shall be net, cash (sight draft) against documents.

SEC. 2. The documents for oil, unless specified to the contrary, shall consist of one negotiable railroad bill of lading; public weighmaster's weight certificate; certificate of analysis (or letter of indemnity guaranteeing purity and ultimate production of certificate of analysis).

RULE 10.—SHIPMENTS

SECTION 1.—Shipments shall be interpreted as follows, effective as of the date written shipping instructions are received by the seller: Quick shipment, within 2 working days; immediate shipment, within 5 working days; prompt shipment, within 10 working days.

RULE 11.—ARBITRATION

SECTION 1. Disagreements and/or disputes, unless amicably adjusted, shall be settled by arbitration in New York on immediate demand of either buyer or seller. Both buyer and seller shall have the option of appointing one arbitrator and these two shall select a third. In all cases the arbitrators shall be accredited representatives or alternate representatives of members of this association or members of the American Paint and Varnish Manufacterers Association and shall take the oath of arbitrators as prescribed by the New York State laws governing arbitrators. They shall sit as a court to hear evidence as submitted either orally or in writing by either or both parties to the controversy. The arbitrators shall have the privilege of questioning all witnesses. All shall be under oath when giving testimony; or, in the case of submission of evidence in writing such evidence shall be sworn to before an official duly authorized to administer the oath wherever such testimony may be given. The decision by the majority of the arbitrators shall be final and binding on both parties.

SEC. 2. Fees for arbitration shall be $25 for each arbitrator, to be paid by party adjudged in default.

RULE 12—TANK CARS

SECTION 1. Tank cars shall be of approximately 8,000-gallon capacity unless stipulated to the contrary.

SEC. 2. Sellers' tank cars must be of standard make and be provided with heater coils, and must be in good order and condition at time of loading.

SEC. 3. Unless otherwise provided, tank cars should be supplied by seller. The seller shall have the option of naming the routing with the exception of the delivering carrier, which shall be at the option of the buyer.

SEC. 4. The buyer shall be allowed one diversion on tank cars while en route, but diversion beyond original destination and/or reconsignment after arrival at destination shall not be permitted without the seller's permission.

SEC. 5. The buyer shall unload tank cars without delay. In the event of detention of tank car by buyer for a period of over 48 hours or reconsignment without permission, the buyer shall be responsible for and pay the seller detention charges and/or rental charges for the use of the tank cars in accordance with the average renting value for the period of the preceding three months.

SEC. 6. The buyer shall respect the instructions of seller covering the return of empty tank car—returning empty tank car in accordance with seller's instructions and furnishing seller promptly with complete information.

SEC. 7. When the buyer furnishes tank cars seller must give buyer instructions for forwarding the empty tank cars in sufficient time to normally enable tank cars to reach destination in time for loading. In the event that the seller fails to furnish instructions in sufficient time or the buyer fails to so forward tank cars, liability shall attach to the party at fault, who shall be liable for all extra expenses incurred.

SEC. 8. Tank cars, whether buyer's or seller's, shall be furnished for loading clean and in a fit condition to receive the particular oil which is being loaded.

C. STANDARD SPECIFICATIONS FOR TUNG OIL

[Established by the American Society for Testing Materials]

Item	Maximum	Minimum
Specific gravity 15.5/15.5° C	0.943	0.9400
Acid number	8	
Saponification number	195	190
Unsapnoifiable matter, per cent	.75	
Refractive index at 25° C	1.520	1.5165
Iodine number (Wijs)		163
Heating test (minutes)	12	

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