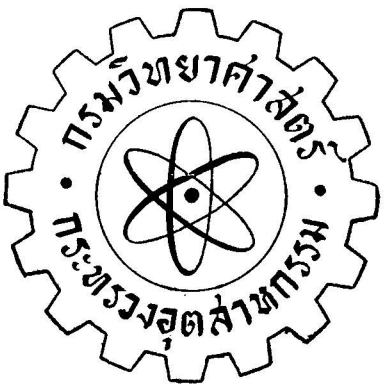
DEPARTMENT OF SCIENCE

MINISTRY OF INDUSTRY

BANGKOK, THAILAND



REPORT NO. 15

FOR THE YEARS 1949 (B.E. 2492) - 1950 (B.E. 2493)

FOREWORD

This is the Fifteenth Report of the Department of Science covering its activities in the years 1949 and 1950. There still remains one more report, the 16th, to catch up with the Thai counterpart. There after, it is hoped, both editions could be presented simultaneously.

Only some of the more interesting results could be summarized in this report; however, those interested in other aspects, topics, or for more details, not published, may submit enquiry to the Department. We will try our best to meet all problems, pertaining to our type of work.

Charng Ratanarat
Dip. Chem., Dr. phil. nat. (magna cum laude)
Director-Genaral

Department of Science,
Ministry of Industry,
Bangkok, Thailand.

STAFF

(December 1950)

Position	Number
Director-General	1
Secretary	1
Senior Chemists, Chiefs of Divisions	4
Senior Chemists,	3
Chemists, Chiefs of Sections.	11
Chiefs of Sections (Administrative)	4
Chemists,	15
Assistant Chemists	39
Assistant Chiefs of Sections (Administrative)	5
Total (excluding laboratory technicians assistants and clerical members)	83

Special Duty

The advice of this Department was required by various governmental agencies and departments as well as the public in connection with scientific matters. Inquiry into and report on technical problems were also sought after.

The Director-General was a member of the UNESCO National Committee, and Chairman of the Science Committee of that Committee. He was, also a member of the Drafting Sub-Committee on the Procedure of the UNESCO-National Committee. As the Director-General, he was member in the Committee on Economics and Industry Division of the National Economic Council. He represented, as a member of the UNESCO National Committee, in the Joint Committee of ECAFE/UNESCO Working Party. He was also appointed Chairman of the Committee on the Revision of Custom Tariffs.

Members of the staff had served during the years in the Organizations and on the following Committees:—

Ministry of Health

As Special Lecturers in 1. the Faculty of Pharmacy, University of Medical Science.
2. the Faculty of Public Health, University of Medical Science.

Committee on Food Control in accordance with Foods Act.

Ministry of Education

As Special Lecturers in
1. the Faculty of Science, Chulalongkorn University.
2. the Faculty of Engineering, Chulalongkorn University.
3. the Royal College of Religious Divinity.

Committee on Science of the UNESCO National Committee.

Ministry of Agricuiture

Sub-Committees on
1. Foods and Nutrition of FAO National Committee.
2. Vita-Rice (Vitaminized Rice) of FAO National Committee.

Committees on
1. Quality Improvement in the production of Sea Salt.
2. Firewood, Charcoal, and Other Fuels.
3. Infested Rice Inspection and Control.

Ministry of Finance

Committees on
1. Production of Gold Coins.
2. Custom Tariffs Revision.
3. Coinage Quality Control.

Ministry of Industry

Committees on
1. Procuring of Chlorine Plant for the Thai Paper Mill.
2. Improvement on the Quality of Liquor Products of the Government Distillery.

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GENERAL REVIEW

The normal resumption of the international trade, disrupted for many years during World War II and the period that followed its conclusion, made posible the procurement of laboratory equipment and chemicals from abroad. The Department of Science was, therefore, in a much better position than previously to fulfil its entrusted duty.

In 1950 budget the Department was provided with the cost for the constructions of a new building, the foundation of which had been laid since 1941, but had to be discontinued due to the outbreak of the world conflict. With this provision, it could render better and for more efficient service.

The Library had been donated with a fund by the Thai Tobacco Monopoly for the Department's work on a special type of adhesive. Although the number of books received increased considerably in this period, the need was still felt that it could function more advantageously, if provided with a greater budget. The United States Information Service held for almost a month an Exhibition of the Recent American Publications in Science at the Library.

The Certification of Locally Manufactured Articles had not yet received sufficiently wide recognition among manufacturers. The numbers submitted for quality certification remained almost the same as in the last Report.

The School of Practical Chemistry had revised and improved its syllabus and teaching references in compliance with the recently developed circumstantial requirement. This period had seen 12 graduates from the school.

The Division of Chemistry was mostly concerned with routine analytical control work. Some interesting results were recorded under its own heading. In the period covered by this Report, it had conducted a mineral spring survey, penetrating deeper into various provinces. The document concerned will be published soon after it

completion. In this Report, Water Analysis Results were shown as annual averages, instead of monthly averages as previously done in the last Report.

The Division of Industrial Chemistry had made many valuable investigations into various interesting problems such as raw materials for ceramic wares, golden coloured glazed tiles for replace on the Phra Pathom Pagoda, raw and prepared Thai foodstuffs in the preparation of Thai Food Table, the quality of alcoholic beverages produced locally, the production of Cassava flour, and the preservation of rice bran.

The Division of Industrial Research had also studied many interesting problems for examples : Lawsone in Henna Leaves, Hydrogenation of Vegetable Oils, Expansion of Wood, Drying Oils, Lac and Seed-Lac, and Ascorbic Acid Content of Thai Fruits and Vegetables. These were recorded in some details under separate headings in this Report.

Other note-worthy activities were : – 1) The Department of Science, on behalf of the Government of Thailand, has become a member of the International Council of Scientific Unions; 2) Symposia on various scientific topics of common interests were held at the Department; 3) 'Science Broadcast' had become more regular, and 4) Provision of training facilities for officials of other departments.

OFFICE OF THE SECRETARY

Secretary	Singto Ratanakasikara
Chief of the Correspondence Section	Ong Thadasih
Chief of the Accounts Section	Siri Juvidya B.S.C.
Chief of the Stores Section	Siri Suvanapathma

THE LIBRARY

The Librarian — Miss Proesiri Bhekanandhana, B.A.

During this period the Library had in possession Scientific books and publications as detailed below:-

Items	No. of Volumes *1949*	No. of Volumes *1950*
1. Books	2,923	2,941
2. Publications	3,571	4,026
3. Periodicals (bound)	1,311	1,395
4. Periodicals (unbound)	3,414	4,199
Total	11,222	12,561

The Department subscribed to 25 British and 36 U.S., making a total of 61 scientific journals. It should have been much more if there had been larger appropriation from the annual budget. The yearly allotment of 15,000 bahts (about 750 U.S. dollars) hardly met the basic necessities, required by a national science library, which the Library is supposed to be.

Donation of 10,875 bahts from the Thai Tobacco Monopoly for the work on Liquid Glue, however, had enabled the Library to acquire a substantial increase of books and publications over the preceding years.

This period had shown a considerable increase of nearly 40 percent in the number of readers; and the number of books on loan totalled 1,911 volumes.

An Exhibition of Recent American Science Publications, sponsored by the United States Information Service was held from 19th September 1949 to 15th October 1949 at a section of the Library. Books on pure and applied sciences of almost every branch were on show. The exhibition had been received with a great deal of public enthusiasm.

Construction Work

Since 1940 the lack of ample working space had been very keenly felt. Neither room for expansion nor accommodation of the increased staff and equipment was possible. The strife, started early in 1941 by the late Director-General, Dr. Toa Labhanukrom, to find suitable site for the new building, had brought some measures of success

The land of about 70 acres was acquired on lease from the Crown's Property, and preparatory work for the new building was launched. Unfortunately, soon after the foundation work had been completed, the construction had to be discontinued because of the out break of the far-eastern conflict.

Appropriation was granted in the 1950 budget and the construction was immediately resumed on the laid foundation. Unfortunately, however, the cost was found prohibitive to follow the original plan. The building had to be limited to two stories instead of three, Even then, the total floor space runs almost to 7,000 square metres, leaving sufficient room for future expansion.

Laboratory furniture and equipment, as well as component buildings for Store, Workshop, Gas, Power, and others have to be implemented. It is believed that, after completion, the Department of Science could render more and better service towards the development of the country.

THE CERTIFICATION OF LOCALLY-MANUFACTURED PRODUCTS

The number of merchandise submitted for official approval totalled 34 samples, of which 24 were for renewal purpose. There were only 10 new products sent for certification. The figures had somewhat declined from the last period; and, moreover, the products, requested for certification comprised mostly of non-essential types The production of consumer's goods locally still needed much encouragement, despite technical assistance already given by the Department.

THE SCHOOL OF PRACTICAL CHEMISTRY

Director	Dr. Charng Ratanarat Dip. Chem., Dr. phil nat. (magna cum laude)
Senior Chemist	Sangar Sharasuvana C.D.A. (Hons.)
Assistant	Pue Rochanapurananda B.S., Dip. Ind. Chem.

During the period covered by this Report the School made radical changes in its curriculum in order to comply with general educational trend. The yearly session was divided into 3 terms instead of the old two half-sessions. The School also considered more advantageous to replace nearly all its books of reference with more up-to-date standard texts. Mechanics was abolished from its syllabus in preference to Physical Chemistry, which would be of greater usefulness to this type of vocational training. The greatest emphasis, however, was placed on the practical side of the training. Laboratory hours were increased to the utmost limit. Students, who were not attending lectures, were always expectet to spend all their available time in Laboratories.

Admittance to the School was resumed towards the end of 1949 since its suspension in 1944 due to the severe shortages of equipment and chemicals on account of the War. Only 8 students, left over since 1943, were graduated.

In 1950 admittance was granted to 20 students, who had passed the entrance examination. One official from the Army Arsenals Department, however was accepted without examination. During the year acquittance was permitted to 2 first-year students on some certain circumstances. Four were graduated at the end of the academic year.

The supply of graduates was still far behind the demand of various organizations, governmental and public.

THE DIVISION OF CHEMISTRY

Senior Chemist, Chief of the Division Luang Vichien Dhatukran
L. ès Sc., I.C. (Poitiers)

Opium Dross Control Section

Chemist, Chief of the Section Surin Milindalekha, Dip. Pharm.,
Cert. of Pharm. Chem.

In this period the samples of raw and prepared opium submitted for analysis totalled 1,151 samples, an increase of nearly 50% over that of the last period.

Method of Sampling :

An agreement was reached in the best method of sampling. Universally standard procedure was adopted. Efficacy and expediency of the new method had proved to the complate satisfaction by all concerned.

Witness in Court :

Analysis of this Section were requested to give evidence in court on three exhibits, suspected to be or to contain opium.

Forensic Chemistry Section

Chemist, Chief of the Section Bhamphen Savavasu B.Sc.

Chemist Miss Rungtavan Bunnag B.S. (Pharm.)

In this period the Section carried out analysis and investigation, a total of 284 samples consisted of the followings :—

	No. of Samples	Results	
		—ve	*+ve*
Fire arms	48	9	36
Blood stains	199	132	67
Seminal stains	9	—	9
Explosives	9	2	7
Incendiaries	5	—	—
Poisons	1	—	1
Match Chemicals	13	—	—

Testification in court was performed by officials of this Section. Testimonials were required for 5 court and police cases during this period.

Cap for Toy Pistols :

Investigation was undertaken into the possible cause of fire, which broke out during the soldering of tinned can, container for toy pistol caps. Laboratory experiment, simulating the conditions of the incident, had shown that the cause of the conflagration was due to too-high temperature used in the soldering. Temperature exceeding 150° C. may have caused the detonation.

Fuel Section

Chemist, Chief of the Section Vongse Naewbhanij A.A.

In addition to fuel analysis ordinarily required by various organizations, the Section also carried out analytical investigation into some interesting natural resources of economic value, with a view for future development as recorded below :—

Lignite :

Lab. No.	Locality
BM. 414	Amphur Kantang, Changwat Trang
BN. 128	Ban Huoy Muang, Amphur Kujinarai, Changwat Kala Sindhu
BN. 410	Tambol Chanae, Gingamphur Sabhayci, Changwat Songra
BN. 411	Tambol Naklua, Amphur Kantang, Changwat Trang
BO. 855	Tambol Klong Kanan, Amphur Muang, Changwat Krabi

	BM. 414	BN. 128	BN. 410	BN. 411	BO. 855
Specific Gravity at 30°C. ..	1.244	—	—	—	1.273
	%	%	%	%	%
Moisture	7.6	4.0	10.8	13.3	26.8
Ash	1.8	52.1	4.3	7.2	6.2
Volatile Matters	51.4	25.1	55.7	45.5	51.9
Fixed Carbon	39.2	18.8	29.2	34.0	15.0
Total Sulphur :	0.6	0.9	1.2	5.8	3.26
1. Organic Sulphur ..	—	—	—	—	1.44
2. Pyritic Sulphur ..	—	—	—	—	1.57
3. Sulphate Sulphur ..	—	—	—	—	0.25
	calories per gramme				
Calorific Value :					
1. As received	7730	3325	6945	5149	4344
2. Moisture-free basis ..	8360	3464	7786	5939	5934

Saw Dust, Loose and Compressed :

A sample of saw dust BM. 143 from miscellaneous timbers, obtained from the East Asiatic Co. Saw Mill, Ban Don, Changwat Surasthani was analysed in comparison with compressed saw dust samples, BP. 91 from Yang wood and BP. 48 from Yang Sien wood, as to their calorific values. The results are tabulated below:—

	BP. 48	BP. 91	BM. 143
	calories	*per*	*gramme*
Calorific Value :			
1. As received	4684	4381	4213
2. Moisture-free basis	5274	4894	4750

General Analysis Section

Chemist, Chief of the Section Miss Priya Chandravekin B.Sc.
Chemist Miss Charungchantana Phalajivin Dip. Pharm.

Milk and Dairy Products :

A total of 878 samples were submitted for analysis. Most of them were imported. The samples found below the legal standards amounted to 4 samples.

Local fresh cow's milk was also analysed. Genuine samples were found to have fat contents well over 4% indicating wilful addition of water before sale by the dealers in order to gain more profit.

Lac and Seed Lac :

Increase in the number of samples sent for analysis reflected greater export trade in this commodity. Acting on the advice of the Department of Science, the Custom Department exempted from export duty any lac or shellac residues, which have solubility in hot alcohol less than 82%. This decision served to increase greatly exportation of crude lac and inferior products, which, otherwise, would have no value at all locally.

Dehydrated Castor Oil :

Evaluation was carried out on a sample of *Kemical* boiled oil, produced locally from castor oil by Dr. Prachuab Bunnag, one time the Director-General of this Department. The sample was proved to be of first quality drying oil. Its utility in the paint industry was consequently recommended.

Metals and Alloys Section

Chemist, Chief of the Section Prem Banijpol B.Sc.

The number of tin metal samples submitted for analysis decreased considerably during this period. The decline was due to improved conditions of the export trade. Stock long accumulated had found ready market abroad.

Gold bar smuggle increased in frequency in this period, probably due to better price in the local market. Purity of the smuggled gold bars, it was noted, decreased gradually from 99.2% down to 96.0%. This was due to the fact that the lower the quality, the higher the profit the smugglers made, as there was no certificate of analysis required in the transaction.

Water Analysis Section

Chemist, Chief of the Section Pravat Isarankura Dip. Ed. (Science)

Samples of drinking water from different localities were analysed and compared with that of the Bangkok Water Work. Results of analysis had shown that Bangkok Water was the best drinking water; and water from other works, though potable and wholesome, still needed improvement in the matters of clarity, colour, and hardness.

Mineral Springs :

Survey of mineral springs was continued more duply into almost all provinces. Samples from 26 springs were taken to the Bangkok laboratory for analysis. From their properties they could be classified into 5 groups.

	No. of Springs
1. Hot, Sulphuretted	1
2. Hot, Chlorinated	5
3. Hot, Slightly Mineral	5
4. Cold, Slightly Mineral	10
5. Cold, Slightly Mineral, containing temporary hardness	5

Detailed report of the findings will be recorded and published as a Document of the Department at an early opportunity.

THE DIVISION OF INDUSTRIAL CHEMISTRY

Senior Chemist, Chief of the Division	Yos Bunnag M.Sc. (Lond.), A.R.C.S., D.I.C.
Chemist, Chief of Ceramics Section	Manoon Prachankhadee Sc.B. Chem.
Chemist, Chief of Minerals Section	Mrs. Sakuntala Bhodhiprasât B.Sc.
Chemist, Chief of Foods Section	Mrs. Phannipa Varavej B.Sc.
Chemist	M.L. Anong Nila-Ubol B.Sc.
Chemist	Mrs. Bûn Lom Tevayananda B.Sc.
Chemist	Mrs. Sanith Suebsaeng B.Sc.
Chemist	Mrs. Anu Osathanondha B.S.

Ceramic Raw Materials :

A survey of raw materials for ceramic industry was made in the northern part of the country. Samples of white clay, felspar and limestone were taken to the Bangkok laboratory for evaluation. 4 samples of white clay were found suitable for earthenware; 2 samples of felspar were proved to be of good quality for porcelain ware; and one sample of limestone had satisfactory property as a glazing component.

Colour-Glazed Tiles :

Constant repair, needed for the maintenance of the Golden Pagoda, at Nakorn Pathom, had rapidly depleted the stock of spare tiles, which had to be imported with difficulty from the Chinese Mainland. Attempt was therefore made to produce them locally, using raw materials available within the country. Highly satisfactory results were obtained by the Department. The golden coloured tiles of various shades could be produced and compared very favourably with the imported tiles.

Thai Food Table :

The need of a Thai Food Table had never been strongly felt until the launching of nutrition survey to study food pattern of Thai population. The Department therefore undertook investigation into the composition of raw foods and prepared dishes in collaboration with the Department of Health. Over 500 items were analysed and studied.

The compilation of the Table is being completed with the addition of vitamin and mineral contents, which could not be done with the then existing facilities.

Nutrition of some staple foods, in relation to market prices, was also examined with the results that for a value of one Baht the following foods could be arranged, in decreasing order, in accordance with the nutritive values they gave :—

1. Duck egg.
2. Pork (medium).
3. Meat (medium).
4. Steamed Platu (a kind of fish, similar to mackerel).
5. Hen egg.

Ores and Minerals :

The number of samples of strategic minerals, wolfram, lead and tin ores, increased appreciably during this period. The quality of wolfram ores, averaged 65-75 % tungsten trioxide, was rated very high. These lots were mostly from the Northern Provinces of Thailand.

This period also saw considerable prospecting of new economic minerals. Manganese ore samples of satisfactory grades were requested for analysis. Its future development was strongly encouraged.

Spirits :

Control analysis was continued on 142 brands of distilled and blended alcoholic drinks as to quality and potability. The slight decrease was due to terminations of the government distillery leases. The following year would see a great increase after granting of new contracts.

The Department had also examined the presence of green coloured sediment in white spirit, produced by the Government Distillery. It was found to be the result of the interaction between the liquor being distilled and the alloy of the distilling column. Frequent cleanings, it was shown, would entirely eliminate this objectionable sediment.

A complaint due to oily layer on the surface of white spirit was investigated. It was proved to be fusel oil, collected while the spirit was left standing in the storage tank too long before bottling. Advice was given to decant off the oil and thoroughly agitate the spirit before sale.

Frauds :

Fraudulence was detected in one sample of toilet soap and in 5 samples of well known brands of orange crush beverages. There had never been such cases previously until that time when aerated soft drinks had become very popular.

Salicylic Acid and Saccharin in Soft Drinks :

Local samples of aerated soft drinks, sent for analysis by the Department of Health, were found to contain saccharin and salicylic acid. A drastic measure was being carefully considered to prevent the reoccurence of this nature.

Damaged Cargo :

21 samples of damaged goods were examined. It was found that 2 were damaged by sea water and 18 by fresh water. The cause of damage of one sample was due to its wrapping paper.

Fermentation :

Alcohol, as bought from the local market, had many undisirable qualities unsuitable for laboratory use. Pilot scale production within the Department afforded inexpensive and first quality alcohol needed. Its production has been continued ever since.

Besides alcohol, wine from the juice of sugar cane was studied. The result so far obtained was highly satisfactory. It could be classified among the first grade wines.

Cassava Flour :

Many complaints, regarding inferior quality of cassava flour, were made by foreign exporters. Probe was therefore launched to find causes of these defects. After careful study tour of the flour mills, the faults were proved to have resulted from the complete lack of knowledge in the technique of the production. Obsolete machinery had also accounted partly for its inferiority. Recommendations were placed before the authority concerned. A pilot demonstration plant was projected as the best means to overcome the producers' reluctance to replace the old machinery with new ones, and to introduce modern technique in its production.

Rice Bran :

Rice bran constitutes a major commodity in livestock and poultry feeds. It could not be kept for uniform distribution on account of its rancidity, which increases very rapidly during storage due to enzymic activity on its oil content. The Department had succeeded in preserving the bran almost indefinitely by extracting out the oil. The extracted oil, if properly purified, could find many uses as an edible oil. The research report was presented before the 1950 Annual Conference of the Science Association of Thailand, and it will be published in the Proceeding subsequently.

THE DIVISION OF INDUSTRIAL RESEARCH

Senior Chemist, Chief of the Division	Nara Boon-Long B.Sc., M.S. (Cornell).
Senior Chemist	Riddhi Subhanka B.Sc. (Physics)., M.S. (Chem. Eng.) (Michigan)
Senior Chemist	Banbota Sudhikam B.S. (Chem.)
Chemist	Miss Ratsamiepen Siribaed Bisuddhi B.S.E.
Chemist	Chalad Virayodhin
Chemist	Miss Viengvibha Kanakakara B.Sc.
Chemist	Sasi Boonyamanop B.Sc.
Chemist	Mrs. Pathum Therawatana B.Sc.
Chemist	Amara Prachankadee
Chemist, Chief of the Workshop	Parl na Pombejra B.Sc. (Physics), B.S. Chem. Eng., B.S. Biochem. Eng.
Chemist, Chief of the Industrial Process Section	Mrs. Rabieb prachankadee M.Sc.
Chemist	Choo-Sakr Vijierajote Dip. Ed., B.S. (Ind. Chem.)
Chemist	Mrs. Nidnoi Sucharitakul B.Sc.

The Division undertook investigation and research into many interesting topics, some of which are abstracted hereunder. Further details may be obtained by direct enquiry to the Department.

Lawsone in Henna Leaves :

A Study was made on lawsone contents of fresh leaves at blossoming time and when without flowers. Lawsone contents were found to be 0.47% and 0.61% respectively. Its reactions bore similarity with those of 2 hydroxy 1-4 naphthoquinone. Lawsone was proved to be a satisfactory dyestuff for hair, silk and wool. Its shades ranged from pale yellowish brown to deep orange.

Vitamin C in Fruits and Vegetables :

The work on vitamin C contents of Thai fruits and vegetables was continued from what had been recorded in the last Report. Waring

Blendor was used in cases where difficulty in sampling arose. The completed work was published as a document of the Department which may be obtained on request from the Secretary's Office.

Pararubber Seed Oil :

Possibilities of the oil as a drying oil were examined. The results of the examination indicated that the rubber content, always present naturally in the expressed oil, had to be removed by solvent before boiling with cobalt oxide as a siccative. Thus obtained, the treated oil could be used as a drying oil in admixture with other oils in paint.

Hydrogenation :

Hydrogenation of cotton seed oil, produced locally, and cod liver oil, were studied, using 15 p.s.i. pressure, 30° C. and 5 % nickel catalyst in the form of Raney Nickel, an alloy of 50-50 nickel-aluminium, which on treating with acid only nickel was left. The vehicle was 50% alcohol solution. Further study was required before conclusion could be drawn.

Expansion of Wood :

A kind of low priced soft timber, very popular in building construction, from Diptherocarpus alatus tree, was studied in comparison with teak, which is priced more than double. Expansion under various treated and untreated conditions was determined. Results had shown that heat treatment over 300° C. could cure the timber almost completely. By this means, its qualities and colour could be improved to equal those of good grade hard wood.

Motor Fuels from Vegetable Oils :

Experiments were made on castor seed oil and coconut oil. The oil was treated with 1% aluminium chloride at 300°-350° C. for 6 hours; then cracked and fractionated into 2 fractions. Unsaturated hydrocarbons were removed by repeated shaking with concentrated sulphuric acid. After washing and neutralizing with alkali, the oil portion was redistilled. Thus treated, the fractions had pale colour, odourless and could be kept indefinitely without changes. More study will be needed before actual testing in motor engine.

OTHER ACTIVITIES

Staff Advanced Training :

10 graduates from the School of Practical Chemistry who were serving as senior members of assistant chemists, were trained for 6 months in advanced course of study, specially designed to equip them better for the rank of Chemist.

Staff Lectures, Broadcasts and Publications :

1. Low Temperature Synthetic Rubber .. .. by Amara Prachankadee, delivered at the Department of Science
2. Preservation of Rice Bran .. .. by Mrs. Sakuntala Bhodhiprasât delivered before the Scince Association of Thailand Annual Conference, 1950

Science broadcasts and publications of the following articles were undertaken by the staffmembers :—

1. The Importance of Sampling for Analysis .. .. by Dr. Charng Ratanarat
2. Improvememts in Shellac Making .. .. by Mrs. Sanith Suebsaeng
3. House Paints .. .. by Puan Proysuwana
4. Vinegar–Quick Process .. .. .. by Miss Ratsamiepen Siribaed Bisuddhi
5. Science Institutions and Quality Control of Export Commodities in Some European Countries .. .. by Dr. Charng Ratanarat
6. Vitamin C and Tooth Decay .. .. by Riddhi Subhanka and Mrs. Virada Thisayamondala

Foreign Visitors :

5 Indonesian experts on Iron and Steel paid a visit to the Department after the end of Bangkok ECAFE Working Party Conference.

Dr. Williams of Williams-Waterman Fund for the Combat of Dietary Diseases had also visited the Department.

Training of Other Department Officials :

During this period the Department was requested to train some officials of other departments in the following subjects:—

No. of Officials	Department	Subject
2	Quarter Master General	Food Analysis
1	Police	Blood Stains, and Firearms
2	Royal Signal Corp	Analysis of Raw Materials, used in the making of Accumulators

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STATISTICS FOR 1949-1950

From	Items	No. of Samples 1949	1950
Ministry of Defence			
	Water, drinking and industrial	4	2
	Water, miscellaneous	–	1
	Fuel oils	–	11
	Lubricating oils	15	11
	Coke	–	1
	Ferrous Alloys	–	2
	Lead	2	–
	Copper	3	–
	Metals and Alloys	2	2
	Ores	7	4
	Chemicals	4	–
	Vegetable Oils	–	3
	Foodstuffs	–	5
	Soils	–	5
	Rocks	5	–
	Miscellaneous	2	1
	Total	44	48
Ministry of Agriculture			
	Water, drinking and industrial	1	–
	Coke	1	–
	Charcoal	1	–
	Other Fuels	–	2
	Tin	–	7
	Metals and Alloys	3	–
	Chemicals	8	–
	Vegetables	–	2
	Foodstuffs	–	6
	Total	14	17

From	Items	No. of Samples 1949	1950
Ministry of Communication			
	Water, drinking and industrial	1	1
	Sea Water	462	303
	Lubricating Oils	1	8
	Coke	2	–
	Coal	–	3
	Charcoal	–	2
	Ferrous Alloys	2	–
	Tin	3	–
	Lead	1	1
	Copper	4	–
	Metals and Alloys	5	6
	Ores	1	2
	Chemicals	4	3
	Vegetable Oils	5	5
	Soils	15	15
	Paints	12	6
	Asphalt	–	8
	Miscellaneous	1	1
	Total	519	364
Ministry of Finance			
	Fuel Oils	3	2
	Suspected opium-containing samples	136	575
	Suspected Exhibits	15	13
	Tin	1	–
	Coinage Tin	8	12
	Lead	9	3
	Metals and Alloys	3	7
	Silver	–	5
	Valuable Alloy	1	–

From	Items	No. of Samples 1949	1950
	Ores	25	33
	Chemicals	3	–
	Raw Opium	4	63
	Prepared Opium	298	28
	Opium Residue	1	–
	Vegetable Oils	12	6
	Spirits	16	22
	Sterilized Milk	19	26
	Evaporated Milk	59	92
	Sweetened Condensed Milk	215	232
	Powdered Milk	79	61
	Foodstuffs	2	–
	Animal Feed	1	–
	Textiles	12	4
	Shellac	–	1
	Lac, Seedlac etc.	3	3
	Fertilizers	2	1
	Dyestuffs	1	8
	Coal tar	2	5
	Miscellaneous	1	3
	Total	931	1,205
Ministry of Commerce			
	Suspected Exhibits	1	–
	Sweetened Condensed Milk	–	2
	Chemicals	2	–
	Foodstuffs	1	1
	Dyestuffs	6	–
	Tannin	1	–
	Miscellaneous	2	–
	Total	13	3

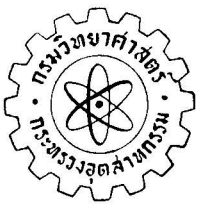
From	Items	No. of Samples 1949	1950
Ministry of Interior			
	Water, drinking and industrial	159	139
	Artesian water	6	5
	Water, miscellaneous	1	–
	Coke	–	1
	Blood Stains	103	92
	Fire Arms	47	5
	Samples, suspected to contain morphine or opium	3	1
	Seminal Stains	5	4
	Faked Coin	–	1
	Tin Metals and Ores (suspected)	14	2
	Miscellaneous Exhibits	23	26
	Silverware	3	–
	Vegetable Oils	4	–
	Clay and Refractory	19	–
	Total	387	276
Ministry of Justice			
	Samples suspected to contain morphine or opium	4	–
	Total	4	–
Ministry of Public Health			
	Water, drinking and industrial	–	3
	Artesian water	2	1
	Water, miscellaneous	31	20
	Miscellaneous Exhibits	–	18
	Non-alcoholic Beverages	–	4
	Fresh Cow Milk	–	65
	Sweetened Condensed Milk	1	–
	Skimmed Evaporated Milk	–	2
	Foodstuffs	9	20
	Food Colours	5	–
	Total	48	133

From	Items	No. of Samples 1949	1950
Ministry of Industry			
	Artesian Water	–	3
	Water, miscellaneous	3	2
	Mineral Water	–	36
	Coal	1	–
	Coke	–	6
	Miscellaneous Fuels	–	2
	Tin	4	3
	Copper	1	–
	Gold	–	5
	Ores	19	63
	Chemicals	4	25
	Raw Opium	20	–
	Vegetable Oil	1	–
	Spirits, special blended	67	35
	Spirits, miscellaneous	38	–
	Non-alcoholic beverages	1	–
	Flour	1	10
	Molasses	13	61
	Foodstuffs	–	14
	Soils	–	1
	Rocks	–	1
	Clay and Refractory	8	16
	Sticklac	–	3
	Lac Residues etc.	3	8
	Fertilizer	–	1
	Gums and Resins	–	3
	Tannin	2	–
	Glue and Adhesives	2	–
	Certification of Merchandise	13	13
	Miscellaneous	8	–
	Total	209	311

From	Items	No. of Samples 1949	1950
Banks and Governmental Organizations			
	Artesian Water	–	4
	Water, miscellaneous	1	–
	Coal	–	2
	Coke	1	–
	Copper	1	–
	Metals and Alloys	2	–
	Gold	4	12
	Chemicals	5	9
	Sweetened Condensed Milk	1	–
	Flour	1	–
	Cane Sugar	1	–
	Total	17	27
Bankok City Council			
	Water, drinking and industrial	60	60
	Chemicals	5	–
	Total	65	60
Semi-Governmental Agencies			
	Water, miscellaneous	3	–
	Ferrous Alloys	–	1
	Lead	2	–
	Metals and Alloys	2	3
	Ores	–	4
	Foodstuffs	1	1
	Rice Bran	–	2
	Animal Feeds	2	–
	Clay and Refractory	22	–
	Grogs	3	–
	Total	35	11

From	Items	No. of Samples 1949	1950
Private Firms and Individuals			
	Artesian Water	7	10
	Water, miscellaneous	4	1
	Sea Water	5	–
	Fuel Oils	7	7
	Lubricating Oils	2	8
	Coal	2	–
	Coke	2	3
	Fuels, miscellaneous	7	–
	Ferrous Alloys	–	1
	Tin	1	12
	Antimony	1	–
	Lead	3	1
	Copper	1	1
	Other Metals and Alloys	16	8
	Silver	–	2
	Ores	75	75
	Chemicals	40	6
	Edible Oils	26	5
	Margarine	1	–
	Vegetable Oils	16	1
	Brandy	–	1
	Non-alcoholic Beverages	–	2
	Sweetened Condensed Milk	8	–
	Evaporated Milk	1	–
	Powdered Milk	–	2
	Skimmed Sweetened Condensed Milk	–	1
	Rice	–	3
	Flour	–	13
	Sugar	4	2
	Molasses	2	4
	Foodstuffs	9	11

From	Items	No. of Samples 1949	1950
	Animal Feeds	2	–
	Insecticide	1	–
	Soils	4	–
	Clay and Refractory	6	2
	Textiles	10	5
	Shellacs	1	2
	Sticklacs	13	3
	Lac Residues etc.	39	9
	Damaged Goods	18	15
	Fertilizers	2	3
	Gum	1	–
	Dyestuff	1	–
	Paints	2	–
	Food Colour	1	–
	Soap	7	1
	Tannin	2	–
	Glue and Adhesive	2	–
	Coal Tar	–	2
	Prepared Solutions	30	14
	Miscellaneous	9	17
	Total	391	253
	Grand Total	2,677	2,708



With the Compliments

of

Department of Science

Ministry of Industry

Bangkok, Thailand