

(No. 71.)



1896.

SESSION II.

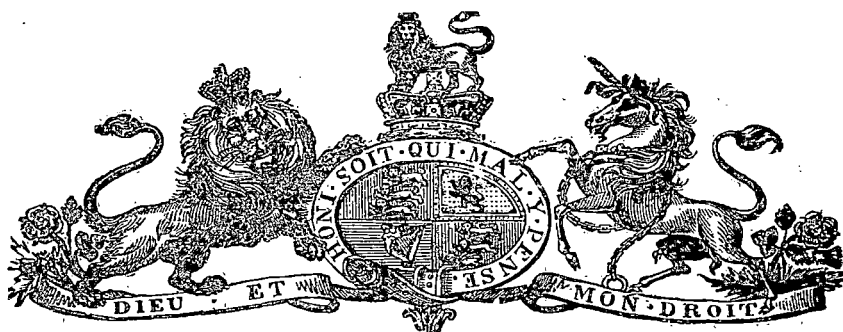
PARLIAMENT OF TASMANIA.

GOVERNMENT ANALYST:

REPORT FOR 1895.

Presented to both Houses of Parliament by His Excellency's Command.

Cost of printing—£2 12s.



GOVERNMENT ANALYST.

REPORT FOR 1895.

Government Laboratories, Hobart, 1st June, 1896.

SIR,

I HAVE the honor to forward herewith statement of analyses and assays, &c. made during the year 1895, which shows, as under, a considerable increase on the numbers for 1894:—

	1894.	1895.
For the Government	{ 1303 teas	1545 teas
	{ 351 others	384 others
For Municipalities	66	35
For private individuals	288	233
TOTALS	<u>2008</u>	<u>2197</u>

It will be seen that while examinations for Municipalities (free) and for private individuals (largely gratuitous) have decreased, those made on behalf of the Government, mainly for Customs and Mines Departments, more than make up for the deficiency.

The benefit derivable from the work done for the Customs is well illustrated by the following figures kindly supplied by the Inspector:—

Duty collected on Oils (exclusive of Kerosene), September to May.	
1894-5	£1901
1895-6	£2825

This increase is mainly attributable to the settlement of the dispute *re* classification of "Oils" under the tariff, which is referred to under that head in the notes attached to the statement. Other instances might be given, but, taking this alone, the increase of duty for eight months only is sufficient to pay nearly twice over for the total yearly cost of this Laboratory.

Other Departments, Mines in particular, Railways, Police, Health, Agriculture, obtain more or less analytical work free of cost, while, on the other hand, Customs duties have to be paid even on imports of chemicals, &c. necessary to carry out this work. I do not advocate that the several Departments should actually be charged fees for the analyses made for them, but I desire to make it perfectly plain that, in conjunction with them, this Department is actually, although not ostensibly, a revenue-producing one, and in this way much more than self-supporting. It appears necessary to emphasize this, as the Department has suffered in the past from misapprehension on the point.

I would specially call attention to the recommendations for the revision of the "Sale of Poisons Act" referred to in the section dealing with analyses for poison, and also to the table under "Manure and Soil," which, if published, should aid the farmers in more readily obtaining the meaning and value of Fertilizer Analyses, which are so variously stated in periodicals and advertisements.

I have the honor to be,
Sir,

Your obedient Servant,

W. F. WARD, A.R.S.M., *Government Analyst.*

The Honorable the Chief Secretary.

RETURN of Examinations made in the Government Laboratories during the Year 1895.

<i>Substance examined.</i>	<i>For the Government.</i>	<i>For Municipalities.</i>	<i>For Private Individuals.</i>	<i>TOTAL.</i>	<i>SEE NOTE.</i>
Tea	1545	...	5	1550	12
Coffee	1	...	...	1	1
Milk .....	...	29	6	35	7
Spirits, Wine, &c.....	20	...	...	20	8
Vinegar and Acetic Acid	60	...	...	60	22
Water	10	3	6	19	12
Sundry, for poison	13	3	2	18	8
Drugs and Chemicals.....	10	...	...	10	5
Kerosene	49	...	...	49	...
Shale and other Oil	58	...	...	58	47
Soil and Manure.....	6	...	8	14	2
Beetroot	2	...	2	4	...
Coal and Fireclay	10	...	1	11	...
Explosives, &c.	11	...	1	12	...
Ore, Blanketings, &c.....	105	...	173	278	...
Gas Works Material .....	...	...	7	7	...
Sundry	29	...	22	51	...
TOTALS.....	1929	35	233	2197	124

NOTE.—The figures in the last column show number of adulterations or defects detected in the case of articles of food or drink, or in manures; practically the whole of the others being cases in which the results of examination have enabled the Customs Department to collect a duty or to levy one at a higher rate.

TEA (1550).

Samples taken from twelve shipments were adulterated with twigs to the extent of 10½ to 16 per cent. This is an evident fraud, the twigs, as noted in former years, being blackened to render them less conspicuous, and added to increase weight and bulk, an adulteration equivalent to the watering of milk.

COFFEE.

This was examined for the Launceston Hospital, and found to consist of about equal parts of coffee and chicory.

MILK (35).

The greater part of these were Launceston samples, the watering detected being comparatively slight, these favourable results being doubtless due to the frequent sampling carried out by the Sanitary Officer.

Three samples selected by the Hobart Police by means of the Lactometer were found to contain 18, 23, and 26 per cent. respectively of added water as the lowest probable amounts, whilst the worst of these had also been skimmed, the cream being reduced to about one-half the natural proportion. Fines were inflicted in these three cases.

By means of the Lactometer and other slight observations taken in sampling, it is practicable for the police to examine a large number of milks in a short time, securing for analysis only doubtful ones, and simplifying thus both their own work and that of this Laboratory; the formal sampling, with a view to possible prosecution, requiring the bottling and sealing of three portions of each milk taken.

SPIRITS, WINE, BEER, (20).

A gin forwarded by the Inspector of Stores was flavoured with some substance of an unusually rank and burning taste, but the quantity received was too small to permit of precise identification of this substance.

Seven samples of spirits of wine tested for the Customs were insufficiently methylated, *i.e.*, not absolutely unfitted for drinking purposes.

Five "unfermented wines," also tested for the Customs, were found to be practically free from alcohol.

VINEGAR AND ACETIC ACID, (60).

So-called vinegars tested for tariff purposes contained from 2.1 up to 26.0 per cent. of acetic acid, the maximum allowable here being 10 per cent., while "vinegar of good quality does not contain much less than 5 per cent., and vinegar containing less than 3 per cent. of real acetic acid may be regarded as diluted with water, or at any rate, as unfit for use," *e.g.*, in pickling.

The weakest samples were reported as "not of proper substance, nature, and quality," and as their sale by retail would have exposed the sellers to prosecution under the Public Health Act, the recommendation was made that the consignments in question should not be allowed to pass through the Customs.

Other vinegars of the same brand received from the Police of Launceston and Latrobe were deficient in acetic acid. One sample contained so much iron in solution that it was necessary to report it as unfit to pass into consumption.

Samples of acetic acid in many cases were found to contain more than 33 per cent. of acid, and therefore to be liable to higher duty, which ranges from 2*d.* to 9*d.* per pint, according to acidity.

The maximum of 10 per cent. of acetic acid in a vinegar appears to be too high, as this strength admits of dilution of one gallon to make three or four gallons of saleable vinegar, while, taking the extreme limits met with, one gallon of 26 per cent. would make over 12 gallons of 2.1 per cent. The duty being one shilling per gallon, dilution means corresponding loss of revenue.

WATER, (19).

The following striking results were obtained:—

	Parts per million of water.		
	1.	2.	3.
Free ammonia.....	0.005	1.20	0.03
Albuminoid ammonia.....	0.02	0.98	0.20
Nitrogen in nitrates	None	0.99	3.06
		Grains per gallon.	
Chlorine in chlorides	0.45	1.3	97.0
Total solid matter	4.40	8.0	183.0

No. 1 is good water for comparison.

No. 2 was taken from a cement tank at a country hotel, and was polluted to an extent which it is to be hoped is quite exceptional. Other samples from adjacent wells and from the neighbouring River George were also more or less unsatisfactory. These, with several others, were examined for the Central Board of Health. No. 3 was a well-water taken from the premises of a milk vendor by the Launceston Sanitary Officer. The large proportion of solid matter, much of which consisted of the purgative salt chloride of magnesium, would render this water unfit for use even by cattle.

About one ounce of sediment from the tank at the Lefroy School contained 15 grains of lead, but fortunately the water itself had dissolved only traces of this poisonous metal. The bulk of the sediment was oxide of iron, from rust or iron paint, with fine particles of silica, and some vegetable matter. Other waters were examined as to fitness for use in steam boilers for the Railway Department, &c., and a supposed mineral water was shown to contain only 17 grains of dissolved solids, chiefly carbonate of lime.

SUNDRY, FOR POISON (18).

A fatal case of poisoning by strychnine has not yet been satisfactorily cleared up. Strychnine was found in the child's stomach, and in the remains of the tea which it drank, and 36 grains of the poison were separated from the contents of the sugar basin; this quantity being much more than enough to kill a whole family.

In connection with this case, and also in view of wholesale malicious poisoning in Queensland, both with uncoloured strychnine, I renewed (by letters dated 26th and 30th of August last) my former recommendations for the amendment of the "Sale of Poisons Act," and I would now again urge that attention be given to this question, and would add a further clause compelling under penalty the present private possessors of uncoloured poisons to add colouring matter thereto. There should then be no room for further cases due to the resemblance of various crystallized poisons to sugar, or to the likeness of those or others in fine powder to flour, salt, baking powder, &c., or should such arise, it would be easy to prove at least criminal negligence; and one case of severe punishment for this would probably be all that was required. Cyanide of potassium for photographers' use could not well be coloured, but this powerful poison should not be sold (as appears to be the case at present) to any *soi-disant* photographer without any registration or witnessing of the sale.

The stomach of a calf, supposed to have been maliciously poisoned, was found to contain many fragments of lead-foil, the animal having apparently ruminated on the lining of a tea chest.

A bottle of medicine, apparently intended for a tonic, contained 4.63 grains only of material in addition to water, nearly half of this being oxide of iron.

Some pills and a mixture received from the police were proved to contain substances popularly considered to be abortifacient.

FREE—To all NERVOUS DEBILITY Sufferers, a certain, easy, and permanent SELF CURE. Having cured myself after years of suffering, misery, and loss of money to quack doctors, I will send full particulars FREE on receipt of an addressed envelope for reply. Address—A Miner, G.P.O., Sydney.

A remedy much advertised, as in the margin, and supplied as a "Self Cure" at the rate of about one guinea per ounce, was found to be Peruvian Bark in powder; the ordinary retail price of this is one shilling per ounce.

DRUGS AND CHEMICALS (10).

These were tested for Customs purposes, or for the police.

KEROSENE (49).

The marked improvement in quality and safety, which has before been noted, was maintained throughout the year.

SHALE, LUBRICATING, AND OTHER OIL (58).

These were all examined for classification under the Tariff. Some difficulty was for a time experienced in this, until it was authoritatively decided that "Black Oil unrefined" meant "Whale Oil," and that mineral oils suitable for ordinary lubricating purposes were dutiable.

The term "Black Oil unrefined" appears to be applied in other colonies both to the crude oil as distilled from shale and to various residues from the crude oil after separation of the portions suitable for illuminating and finer lubricating purposes.

MANURE AND SOIL (14.)

A soil gave the following results, which show an all-round deficiency on comparison with those yielded by good soil given for comparison :—

	Per 100,000.	Good Soil.
Nitrogen.....	105	250, not less
Phosphoric acid.....	26	150 "
Potash	114	200 "
Lime	340	400 "
Chlorine.....	20	35, not more
Soda	117	

The variations in quality of manures sold under the same name, and the consequent need for guarantee of quality at sale, are shown by the following percentages obtained from different samples :—

Guano.

Phosphoric Acid.....	{ 7·1 per cent. 56 per cent. sand }	to 27·5 per cent.
equivalent to Phosphate of Lime	15·5 per cent. to 60·0 per cent.	

Bonedust.

Phosphoric Acid.....	15·4 per cent. to 19·24 per cent.	
equivalent to Phosphate of Lime.....	33·6 ,, to 42·0 per cent.	
Nitrogen	4·0 ,, to 5·63 ,,	
equivalent to Ammonia.....	4·86 ,, to 6·84 per cent.	

Taking Phosphoric Acid at the value of 2s. 3d. per unit in the Guano, the figures given represent prices of 16s. and 62s., or a difference of 46s. per ton.

The Bonedust may for comparative purposes be taken at 3s. 6d. per unit of Phosphoric Acid, and 7s. 6d. per unit of Nitrogen, which would give a range of values from 54s. to 67s. per ton for the Phosphoric Acid, and from 30s. to 42s. for the Nitrogen.

Enquiries having been made as to the relative values of the several phosphates mentioned in books on agriculture, &c., the table following was drawn up. It is obvious that no farmer can be expected to bear such details in mind, and it was pointed out that all that is really necessary to be known in the case of phosphatic manures is the percentage, not of any particular phosphate, but simply that of Phosphoric Acid, and whether this is soluble or insoluble in water. Similarly, Nitrogen may be present in a manure in Salts of Ammonia, in organic matter, or in nitrates, while Potash may be met with as Sulphate, Chloride, or Nitrate, &c.; but the main point is the proportion and origin of the Nitrogen and the Potash.

COMPOSITION PER CENT.

No.	Various Names.	Phosphoric Acid.	Lime.	Water.
1.	Tetrabasic Phosphate of Lime	38·8	61·2	—
	Tetracalcic Phosphate			
	Said to occur in "Thomas Phosphate," which is ground "Basic Slag or Cinder."			
2.	Bone Phosphate	45·8	54·2	—
	Insoluble Phosphate of Lime			
	Tribasic Phosphate of Lime			
	Tricalcic Phosphate			
	"Soluble Phosphate" now means this Phosphate rendered soluble by treatment with Sulphuric Acid.			
3.	Revert Phosphate of Lime	52·2	41·2	6·6
	Reconverted Phosphate of Lime			
	Retrograde Phosphate of Lime			
	Reduced Phosphate of Lime.....			
	Bicalcium Phosphate of Lime			
	This forms when No. 6 is kept for a time.			

No.	Various Names.	Phosphoric Acid.	Lime.	Water.
4.	"Precipitated Phosphate" consists of a mixture of Nos. 2 and 3.			
5.	Calcium Pyrophosphate formed on heating No. 3	55.9	44.1	—
6.	Superphosphate of Lime.....	60.7	23.9	15.4
	Soluble Phosphate of Lime			
	Monocalcium Phosphate			
	Formed by treating Bone, or Mineral Phosphate (No. 2), with Sulphuric Acid.			
7.	Biphosphate of Lime	71.7	28.3	—
	Metaphosphate of Lime.....			
	Monobasic Phosphate of Lime.....			
	Formed on heating No. 6.			

NITROGEN COMPOUNDS.

	Nitrogen per cent. = Ammonia per cent.	
Ammonia.....	82.4	—
Sulphate of Ammonia.....	21.2	25.8
Chloride of Ammonium.....	26.2	31.8
Nitrate of Soda	16.5	20.0
Chili Saltpetre.....		
Cubic Nitre.....		
Nitrate of Potash	13.9	16.8
Saltpetre		
Nitre		
Organic Matter	16.0	19.4
Albuminoid Matter, in dried blood, bones, and in animal and vegetable matter generally	downwards	downwards

POTASH COMPOUNDS.

	Potash per cent.
Nitrate of Potash	46.6
Muriate of Potash	63.1
Potash Chloride	
Carbonate of Potash	68.1
Pearl-ash (in wood ashes).....	54.0
Sulphate of Potash, occurs in Kainit.....	

BEETROOT (4).

These contained from 12 to 15.7 per cent. of sugar; one root which was left in the ground, and only pulled in August, yielded 12.7 per cent.

COAL AND FIRECLAY (11).

Several of the Coals were tested for evaporative or steam-raising power with satisfactory results.

EXPLOSIVES, &c., (12).

These were all found to be in good safe condition, and some Safety Fuse tested burned with great regularity.

In connection with a charge of attempting to do bodily harm with Dynamite Detonators, report was made that the effects of an explosion of Fulminating Mercury (with which the Detonators are charged) are felt only at a short distance from the point of explosion, where the pressure exerted is enormous, but the Fulminate may actually be exploded in the middle of a glass tube of one inch in diameter without the tube being broken.

The Detonators in the case referred to were introduced into firewood for the purpose of detecting theft of the wood.

ORE AND TAILINGS FOR GOLD, SILVER, &c., (278).

A large proportion of these were samples taken by the Geological Surveyor, and examined for the Secretary of Mines. Nickel, Cobalt, Copper, Tin, Antimony, Bismuth, Zinc, Lead, &c. being determined in many cases, in addition to the usual Gold and Silver.

A sample from N. Dundas contained Silver at the rate of 1057 ounces per ton, and Gold specimens gave 60 to 63 ounces, while various Pyrites "Blanketings" ranged from 20 to 40 ounces of Gold, with 12 ounces of Silver.

Some Pyrites Concentrates received from the Secretary of Mines were examined for cause of bad amalgamation. A number of small pieces of Metallic Copper, due in all probability to accidental introduction into the battery, were found; but the real difficulty appeared to be due to the highly arsenical character of the Pyrites.

GAS WORKS MATERIAL (7).

These were fresh Oxide of Iron for removal of Sulphur from the Gas, "Spent" Oxide containing much Sulphur, and "Gas Liquors," in which the Ammonia given off by the Coal is dissolved. One ton of good Coal is said to yield about ten gallons of Gas Liquor, containing about five ounces of Ammonia per gallon. Sulphate of Ammonia, so largely used as a manure, is obtained from this.

Tasmanian Iron Ore is now used in gas-purifying in place of that formerly imported.

SUNDRY (51).

These included Tannin Extract, Asphalt, Dye Stuffs, Ambergris, Paraffin, and "Amygdaline." This last was examined for the Customs, and found to be mainly Turpentine scented with Nitro-Benzene, or Artificial Oil of Bitter Almonds, and liable to a duty of one shilling per gallon as Turpentine.

Nitro-Benzene is described as "an active poison of a peculiarly insidious nature." The vapour may prove injurious even when very largely diluted with air, and bad effects are said to have been produced by the use of soap scented with it.

These objections to its employment in soapmaking, for which purpose it is imported, have been pointed out on previous occasions.

A consignment of straw hats, imported on Government account, having been greatly stained in transit by leakage of other cargo, the nature of the liquid causing the damage was determined for the Inspector of Stores.

W. F. WARD, *A.R.S.M.*, *Government Analyst.*