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Statistics**

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Development
Business Enterprises
Australia**

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**RESEARCH AND EXPERIMENTAL DEVELOPMENT
BUSINESS ENTERPRISES, AUSTRALIA
1986-87**

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AUSTRALIAN BUREAU OF STATISTICS

CATALOGUE NO. 8104.0

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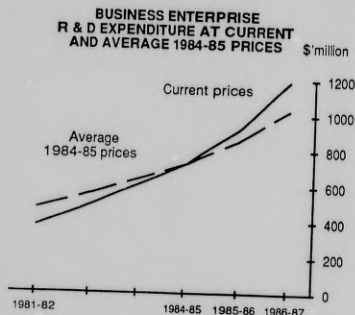
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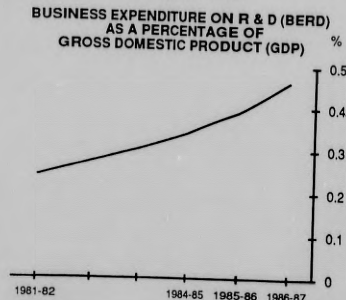
MAIN FEATURES

The estimate of expenditure on Research and Experimental Development (R&D) carried out by business enterprises in Australia during 1986-87 has been revised upwards 10% on the preliminary estimate to \$1189m at current prices. This represents a 29% increase in expenditure over 1985-86. At average 1984-85 prices, R&D expenditure is estimated to have increased by 20% over this period.

Expenditure by private business enterprises was \$1069m at current prices and by public business enterprises \$121m at current prices. At average 1984-85 prices, compared with 1985-86, these represent increases of 20% and 17% respectively over 1985-86.



Business Expenditure on Research and Development (BERD) carried out in Australia as a percentage of Gross Domestic Product (GDP) was 0.46% in 1986-87. This represents an improvement of 0.07 percentage points over 1985-86. This indicator was 0.24% in 1981-82, 0.34% in 1984-85 and 0.39% in 1985-86. See paragraph 6 for GDP figures used.



Human resources devoted to R&D carried out by business enterprises in Australia during 1986-87 were 16,368 person years. This represents a 16% increase compared with 1985-86.

Payments for technical know-how by business enterprises in Australia in 1986-87 were \$277m (an increase of 67% compared with 1984-85). Receipts for technical know-how by business enterprises in Australia in 1986-87 were \$106m (an increase of 195% compared with 1984-85). The 1986-87 statistics have been revised upwards by 7% and 22% respectively since the preliminary publication.

EXPLANATORY NOTES

Introduction

This publication presents revised estimates of expenditure and human resources devoted to R&D carried out by private and public business enterprises during 1986-87. They replace the preliminary estimates published on 18 April 1988 (Catalogue 8105.0).

2. Comparable R&D statistics are produced for the General Government, Private Non-profit and Higher Education sectors (See paragraph 40).

Data sources

3. The 1986-87 statistics presented in this publication have been compiled from data collected from business enterprises in the Survey of Research and Experimental Development in respect of the year ended 30 June 1987. This survey was based on a complete enumeration of businesses identified by the Australian Bureau of Statistics (ABS) as likely R&D performers. The survey was conducted by mailed questionnaires and a 86% response was obtained. Non-respondents were expected to be non-R&D performers.

4. The 1981-82 and 1984-85 statistics in this publication were derived from similar R&D surveys. The 1985-86 statistics were derived from a stratified random sample of businesses identified as likely R&D performers. A number of revisions have been made to previous statistics.

5. Statistics from other ABS surveys necessary to provide further R&D intensity details are not yet available. These details and limited additional R&D statistics will be available from the ABS when compiled.

6. The GDP figures used to derive BERD/GDP ratios quoted in the Main Features are current at time of manuscript finalisation and are as follows: \$155,737m (1981-82); \$211,483m (1984-85); \$236,190m (1985-86); and \$260,384m (1986-87). Note that these figures are subject to further revision. For further information please see *Australian National Accounts, 1986-87 Summary* (5201.0).

Definitions

7. *Research and Experimental Development* is defined in accordance with the Organisation for Economic Co-operation and Development (OECD) standard as comprising 'creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society and the use of this stock of knowledge to devise new applications'.

8. R&D activity in the business context is systematic investigation or experimentation involving innovation or technical risk, the outcome of which is *new knowledge*, with or without a specific practical application or *new or improved* products, processes, materials, devices or services. R&D activity extends to modifications to existing products/processes. R&D activity ceases and pre-production begins when work is no longer experimental.

9. The definition of R&D was extended for the 1984-85 survey, in accordance with a change in OECD standards, to include research into and development (or substantial modification) of computer software such as applications software, new programming languages and new operating systems. R&D expenditure on software development in 1984-85 was \$67m, and in 1986-87 was \$156m.

10. For a more comprehensive interpretation of the definition of R&D activity, contact the ABS or refer to the OECD publication *The Measurement of Scientific and Technical Activities* ("Frascati Manual" 1980) OECD, Paris, 1981.

11. *Intramural* R&D statistics presented in this publication refer to R&D activity *carried out* by a business enterprise on its *own* behalf or on behalf of other enterprises, institutions or individuals.

12. *Extramural* R&D statistics refer to R&D activity *funded* by a business enterprise but *carried out* by other enterprises, institutions or individuals.

13. *Technical Know-How (TKH)* is the specialised technical knowledge required to successfully produce a product or implement a process, etc. (e.g. patent licences; technical data and information; scientific, technical or engineering assistance) that increases technical knowledge and understanding in an enterprise. Payments are those made directly to the holders of TKH which is new to a business enterprise. They exclude non-monetary transfers, and costs incurred by an enterprise in obtaining TKH, such as overseas travel costs.

14. *Energy* R&D statistics refer to R&D activity directed towards the producing, storing, transmitting, utilising and conserving of energy.

15. R&D expenditure includes *capital* expenditure on the acquisition (less disposals) of fixed tangible assets such as land, buildings, vehicles, plant, machinery and equipment attributable to R&D activity; *current* expenditure on wages, salaries and other labour costs, materials, fuels, rent and leasing, repairs and maintenance, data processing etc. and the proportion of expenditure on general services

and overheads which is attributable to R&D activity. Respondents were asked to report data on an accruals basis of accounting.

16. *Human resources* devoted to R&D *measures* the effort of researchers, technicians and other staff *directly* involved with R&D activity. Overhead staff (e.g. administrative and general services employees such as personnel officers, janitors, etc.) whose work *indirectly* supports R&D activity, are *excluded*.

17. *Researchers* are those involved with the conception and/or development of new products/processes. They include project managers, directors, scientists and engineers concerned with project content but exclude those concerned with administrative matters.

18. *Technicians* are those performing technical tasks in support of R&D activity, normally under the direction and supervision of a researcher. These tasks include performing experiments, maintaining and operating advanced equipment and computer programming.

19. *Other supporting staff* are those skilled and unskilled craftspersons, secretarial and clerical staff directly associated with R&D activity.

20. *Type of R&D activity* comprises basic research, applied research and experimental development. Data in this classification are subjectively allocated by respondents at the time of reporting, using OECD/ABS definitions. ABS makes every effort to ensure correct and consistent interpretation and reporting of this data and applies consistent processing methodologies. Analysts using this classification should bear the original subjectivity in mind.

21. *Basic research* is experimental and theoretical work undertaken primarily to acquire new knowledge without a specific application in view. It consists of pure basic research and strategic basic research. *Pure* basic research is carried out without looking for long term benefits other than the advancement of knowledge. *Strategic* basic research is directed into specified broad areas in the expectation of useful discoveries. It provides the broad base of knowledge necessary for the solution of recognised practical problems.

22. *Applied research* is original work undertaken in order to acquire new knowledge with a specific practical application in view. It is undertaken either to determine possible uses for the findings of basic research or to determine new methods of achieving some specific and pre-determined objectives.

23. *Experimental development* is systematic work, using existing knowledge gained from research or practical experience, for the purpose of creating new or improved products/processes.

Scope

24. The scope of this survey is all enterprises within the Business Enterprise sector of Australia.

25. The *Business Enterprise* sector includes all enterprises whose primary activity is the production of goods or services for sale to the general public at a price intended to cover at least the cost of production, and the private non-profit institutions mainly serving them.

26. The organisational unit for the collection of R&D statistics is the enterprise. An enterprise is defined broadly as the unit comprising all the operations in Australia of a single operating legal entity (e.g. company, partnership or sole proprietor).

27. The vast majority of enterprises in this sector are private businesses. The remainder are public business enterprises mainly engaged in trading or financial activities.

Coverage

28. The 1986-87 R&D survey comprised a complete enumeration of business enterprises identified by the ABS as likely to have:

- (a) carried out R&D activity; or
- (b) funded R&D activity to be carried out by other enterprises, institutions or individuals.

29. Within the scope of the survey, enterprises were included in the collection if they satisfied any of the following criteria:

(a) Enterprises recorded in the ABS's central register of economic units as:

- (i) public sector trading and financial enterprises; or
- (ii) mainly engaged in (or with establishments engaged in) certain industries within Basic Chemicals (ASIC Group 275), Other Chemical Products (ASIC Group 276), Appliances and Electrical Equipment (ASIC Group 335), Industrial Machinery and Equipment (ASIC Group 336), Consultant Engineering or Technical Services n.e.c. (ASIC Class 6336), or Research and Scientific Institutions (ASIC Class 8461); or

(iii) having a research laboratory.

(b) Enterprises which applied for grants from the Grants for Industry Research and Development (GIRD) Scheme.

(c) Enterprises which, in previous R&D surveys, reported R&D activity, payments or receipts for TKH, or patent activity.

(d) Enterprises identified from reports in newspapers, industrial journals, research compendia etc. as likely to have R&D activity.

30. The ABS continues to investigate enhancement of the above criteria, or the introduction of additional criteria, with the aim of further improving the coverage of the R&D survey. In the past this coverage has been calculated as accounting for very high percentages, usually in the high nineties, of R&D activity.

31. Enterprises mainly engaged in agriculture, forestry, fishing and hunting (ie. industries in Division A of the *Australian Standard Industrial Classification (ASIC)*, 1983 edition) are excluded from this publication, partly because of collection difficulties and partly because such enterprises are believed to have very low R&D activity (agricultural R&D activity is generally carried out by specialised research institutes not included in ASIC Division A).

32. The 1984-85, 1985-86 and 1986-87 statistics in this publication are classified by the industry of the enterprise in accordance with the 1983 edition of the ASIC. The 1981-82 statistics are classified in accordance with the 1978 edition of the ASIC. If the 1983 edition were used to classify the earlier statistics, only minor differences would occur.

33. Each enterprise is classified to the industry in which it mainly operates even though one or more of its component establishments (factories, shops, etc.) may be classified to other industries. For further comment see the *Australian Standard Industrial Classification*, 1983 Volume 1 (1201.0).

34. Tables 16 through 19 contain a classification of R&D expenditure by the industry of the product/process field towards which the R&D activity was directed. This involved asking each respondent to list the products/processes towards which its R&D activity was directed and apportion its total R&D expenditure. The ABS coded each product/process to the ASIC industry in which it would be mainly produced or performed. For example, an enterprise classified as being in mining may have performed R&D activity into a more efficient ore crusher. As the manufacture of ore crushers would be classified to ASIC Class 3369 then the R&D expenditure would also be classified to this Class.

35. Table 37 contains Energy R&D activity classified by energy objective code. The energy objective categories refer to the principal areas of national benefit rather than the immediate objectives of the research. For the purposes of this table energy objective codes have been grouped to accord with the International Energy Agency *standard energy technology areas*.

Constant price estimates

36. Estimates of total R&D expenditure are shown at average 1984-85 prices in Table 1. In concept, constant price estimates are measures from which direct effects of price change have been eliminated. Although expressed in monetary terms, the constant price measures shown vary only with changes in the underlying quantities of inputs purchased (including labour). In effect, quantities of broadly defined categories of inputs are weighted by their

prices in the base year (1984-85). Because the measures related to input quantities, they do not reflect changes in the efficiency with which labour, capital and other inputs are used.

37. The estimate of the labour costs component was obtained by multiplying, for each broad category of labour used in each period by the relevant average labour costs in the base year (1984-85). The non-labour costs components were estimated by deflating each by a composite price index of relevant materials or capital expenditure items. In revaluing R&D non-labour expenditure, extensive use has been made of price series used in deriving constant price national accounts estimates.

38. The base year of constant price estimates of R&D expenditure contained in this issue has been changed to 1984-85. (Since the 1981-82 R&D survey, constant price estimates have been published on a 1979-80 base). Periodic rebasing of constant price estimates is necessary to take account of changed price relativities and structural relationships in the economy. The choice of base year influences the movements in the constant price series, and the usefulness of such series is diminished if the relative price weights of the base year differ significantly from the price relationships in other periods included in this series. The more remote a base year is from the current period, the less likely that its relative prices will reflect the current situation. A more detailed discussion of the need for rebasing constant price estimates, and factors affecting the choice of base year are contained in the information paper *Change in Base Year of Constant Price estimates from 1979-80 to 1984-85* (5227.0) released on 6 June 1988.

Reliability of statistics

39. The statistics contained in this publication should be interpreted with caution for the following reasons:

- (a) Many respondents had to make estimates because their accounts do not separately record data on R&D activity, receipts and payments for TKH or patent activity.
- (b) The OECD standard definition of R&D differs in some respects from what respondents may regard as R&D activity, particularly since the definitions used within the GIRD scheme for the allocation of grants, and the 150 per cent Tax Concession Scheme for tax deductibility for specific R&D activities undertaken within Australia, differ slightly from the R&D survey definition.

- (c) The coverage of R&D is not complete. For further information see paragraphs 28-31.

Related publications and information

40. Users may also wish to refer to the following publications:

Research and Experimental Development, All Sector Summary (Inter Year Survey), Australia, 1985-86 (8122.0)

Research and Experimental Development, General Government and Private Non-profit Organisations, Australia, 1986-87, (8109.0) (To be released shortly)

Research and Experimental Development, Higher Education Organisations, Australia, 1986-87, (8111.0) (To be released shortly)

Research and Experimental Development, All Sector Summary, Australia, 1986-87 (8112.0) (To be released shortly)

Measures of Science and Innovation, Australian Science and Technology Indicators Report, Department of Industry, Technology and Commerce, Canberra, Australia, 1987

Science and Technology Statement, 1987-88, Department of Industry, Technology and Commerce, Canberra, Australia, 1988

Main S & T Indicators 1982-88, OECD, Paris, 1988

The Measurement of Scientific and Technical Activities ("Frasati Manual") 1980) OECD, Paris, 1981

41. Current publications produced by the ABS are listed in the *Catalogue of Publications, Australia* (1101.0). The ABS also issues, on Tuesdays and Fridays, a *Publications Advice* (1105.0) which lists publications to be released in the next few days. The Catalogue and Publications advice are available from any ABS office.

Symbols and other usages

- r figures or series revised since previous issue
- n.e.c. not elsewhere classified
- n.p. not available for separate publication (but included in totals where applicable)
- n.a. not available
- nil or rounded to zero

42. Where figures have been rounded, discrepancies may occur between sums of the component items and totals.

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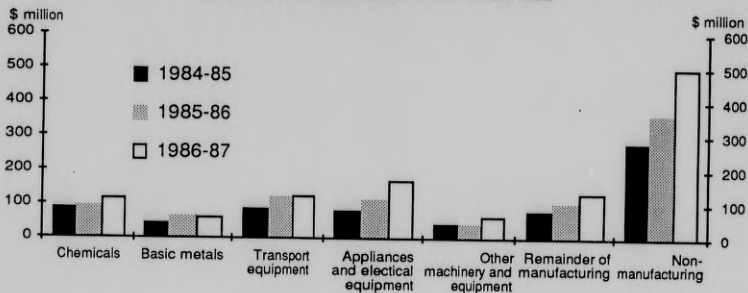
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**RESEARCH AND EXPERIMENTAL DEVELOPMENT
CARRIED OUT BY BUSINESS ENTERPRISES-AUSTRALIA 1984-85, 1985-86 AND 1986-87
R & D EXPENDITURE BY INDUSTRY OF ENTERPRISE**



**RESEARCH AND EXPERIMENTAL DEVELOPMENT
CARRIED OUT BY BUSINESS ENTERPRISES-AUSTRALIA 1984-85, 1985-86, 1986-87
R & D EXPENDITURE BY INDUSTRY OF ENTERPRISE AS A PERCENTAGE OF TOTAL R & D EXPENDITURE**

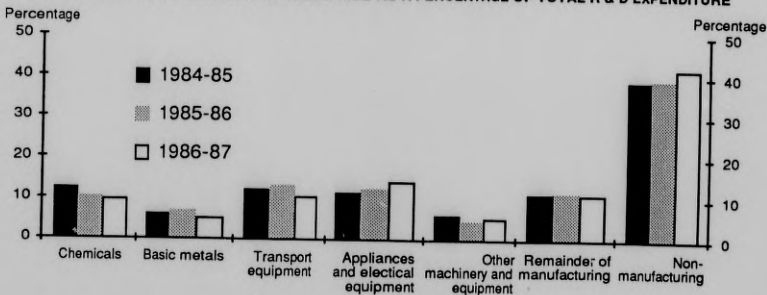


TABLE 1. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES(a), AUSTRALIA
R & D EXPENDITURE AT CURRENT AND AVERAGE 1984-85 PRICES
(\$m)

	1981-82	1984-85r	1985-86r	1986-87
AT CURRENT PRICES				
Private Sector	318.9	645.7	(b)826.4	1,068.6
Public Sector	54.8	77.3	95.7	120.7
TOTAL BUSINESS ENTERPRISES	373.7	723.0	(b)922.1	1189.3
AT AVERAGE 1984-85 PRICES				
Private Sector	393.4	645.7	(c)768.3	922.3
Public Sector	77.4	77.3	89.3	104.3
TOTAL BUSINESS ENTERPRISES	470.7	723.0	(c)857.6	1,026.7

(a) Excludes enterprises in ASIC Division 'A' (b) The standard error associated with this estimate is \$6.7m (c) Although it is difficult to estimate the standard error associated with this estimate, at a minimum it is likely to be \$5.8m

TABLE 2. HUMAN RESOURCES DEVOTED RESEARCH AND EXPERIMENTAL DEVELOPMENT
BY BUSINESS ENTERPRISES(a), AUSTRALIA
(person years)

	1981-82	1984-85r	1985-86r	1986-87
Private Sector	7,478	11,022	(b)12,775	14,998
Public Sector	1,010	1,238	1,353	1,370
TOTAL BUSINESS ENTERPRISES	8,489	12,260	(b)14,128	16,368

(a) Excludes enterprises in ASIC Division 'A' (b) The standard error associated with this estimate is 112.0 person years

TABLE 3. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES(a), AUSTRALIA
DETAILS OF RESOURCES DEVOTED TO R & D BY INDUSTRY OF ENTERPRISE(b)

ASIC Code	Industry of enterprise Description	Enterprises (number)			Expenditure on R & D (\$m)				Person years of effort on R & D			
		1981-82	1984-85r	1986-87	1981-82	1984-85r	1985-86(c)r	1986-87	1981-82	1984-85r	1985-86(c)r	1986-87
11-15	MINING (excluding services to mining)	23	31	37	22.6	29.8	n.a.	51.1	381	297	n.a.	347
	<i>Manufacturing -</i>											
21	Food, beverages and tobacco	72	92	99	14.1	30.9	n.a.	55.0	390	658	n.a.	778
23-24	Textiles, clothing and footwear	16	27	35	0.8	5.6	n.a.	12.9	24	57	n.a.	119
25	Wood, wood products and furniture	19	29	46	1.7	3.4	n.a.	6.3	43	69	n.a.	118
26	Paper, paper products, printing and publishing	12	22	31	5.3	6.4	n.a.	9.4	125	139	n.a.	156
27	Chemical, petroleum and coal products	128	180	267	57.3	91.1	96.8	119.0	1,307	1,576	1,596	1,832
28	Non-metallic mineral products	22	33	37	5.8	12.9	n.a.	14.9	126	223	n.a.	172
29	Basic metal products	27	32	45	27.1	46.1	66.7	64.5	672	681	889	861
31	Fabricated metal products	83	92	125	7.1	15.6	n.a.	21.5	170	309	n.a.	379
32	Transport equipment	54	65	96	48.1	90.1	124.3	126.9	1,087	1,476	1,702	1,552
334	Photographic, professional and scientific equipment	26	30	64	6.3	16.5	n.a.	25.3	183	283	n.a.	426
335	Appliances and electrical equipment	159	286	580	41.4	84.4	117.0	172.4	1,029	1,611	1,982	2,790
336	Industrial machinery and equipment	156	177	242	15.7	28.5	n.a.	41.9	443	566	n.a.	692
34	Miscellaneous manufacturing	66	77	96	7.6	8.5	n.a.	15.9	186	178	n.a.	245
C	TOTAL MANUFACTURING	840	1,142	1,763	238.3	440.1	555.4	685.9	5,784	7,824	8,824	10,120
	<i>Other industries -</i>											
F	Wholesale and retail trade	106	194	286	12.5	36.5	n.a.	68.4	296	641	n.a.	1,019
63	Property and business services	206	450	569	20.2	82.2	n.a.	170.7	499	1,311	n.a.	2,245
8461	Research and scientific institutions	31	43	79	23.0	28.8	n.a.	44.8	485	497	n.a.	636
(d)	Other n.e.c.	72	125	198	57.1	105.7	n.a.	168.4	1,042	1,691	n.a.	2,000
16, D-L	TOTAL OTHER INDUSTRIES	415	812	1,132	112.9	253.1	n.a.	452.4	2,324	4,140	n.a.	5,901
	TOTAL ALL INDUSTRIES	1,278	1,985	2,932	373.7	723.0	922.1	1,189.3	8,489	12,260	14,128	16,368
	Private Sector Contribution	1,212	1,938	2,873	318.9	645.7	826.4	1,068.6	7,478	11,022	12,775	14,998
	Public Sector Contribution	66	47	59	54.8	77.3	95.7	120.7	1,010	1,238	1,353	1,370

(a) Excludes enterprises in ASIC Division 'A' (b) 1984-85 and 1986-87 data are classified by the 1983 edition of ASIC; 1981-82 data are classified by the 1978 version of ASIC. If the 1983 version were used to classify 1981-82 data, only minor differences would occur. (c) Represents the most detailed data available for 1985-86. Manufacturing total not equal to sum of manufacturing components. (d)

TABLE 4. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES(a), AUSTRALIA, 1986-87
BROAD INDICATORS BY INDUSTRY OF ENTERPRISE

Industry of enterprise		Resources devoted to R & D				R & D intensity	
ASIC Code	Description	Enterprises (number)	Expenditure (\$'000)	Human resource effort (person years)	Researcher effort (person years)	Expenditure(b) (\$'000)	Human resource effort(c)(%)
<i>Mining -</i>							
11	Metallic minerals	16	38,721	270	92	143.20	1.04
12-15	Non-metallic minerals	21	12,411	76	32	162.65	0.34
11-15 TOTAL MINING (excluding services to mining)		37	51,132	347	124	147.48	0.71
<i>Manufacturing -</i>							
211	Meat products	12	4,875	96	31	50.88	0.88
212	Milk products	15	15,613	143	82	109.26	0.94
213	Fruit and vegetable products	10	1,579	31	17	51.59	0.94
214,217	Margarine, oils, fats n.e.c. and other food products	37	19,993	267	143	74.99	1.12
215,216	Flour mill and cereal food products, bread, cakes and biscuits	14	8,593	170	102	50.43	0.59
218,219	Beverages, malt and tobacco products	11	4,328	71	31	60.70	0.56
21	Total food, beverages and tobacco	99	54,980	778	405	70.70	0.82
234	Textile fibres, yarns and woven fibres	12	2,295	42	14	54.78	0.63
235,24	Other textile products, clothing and footwear	23	10,648	78	53	137.39	1.40
23,24	Total textiles, clothing and footwear	35	12,943	119	67	108.40	0.98
25	Wood, wood products and furniture	46	6,299	118	54	53.34	1.10
263	Paper and paper products	14	7,794	120	59	64.79	0.26
264	Printing and allied industries	17	1,573	36	22	44.19	0.74
26	Total paper, paper products, printing and publishing	31	9,367	156	80	60.08	0.31
2753	Synthetic resins and rubber	22	9,815	176	107	55.86	3.90
2754,	Organic and inorganic industrial chemicals n.e.c.	51	14,036	192	115	73.26	4.24
2762	Paints	39	9,949	248	153	40.20	4.46
2763	Pharmaceutical and veterinary products	62	43,852	617	316	71.08	5.15
(d)	Other chemical, petroleum and coal products	93	41,300	601	371	68.75	2.81
27	Total chemical, petroleum and coal products	267	118,952	1,832	1,061	64.92	3.82
287	Cement and concrete products	17	6,258	65	23	95.99	1.05
285,286,	Glass, clay and other non-metallic mineral products	20	8,611	107	43	80.63	2.03
288	Total non-metallic mineral products	37	14,870	172	66	86.45	1.50
294	Basic iron and steel	21	n.p.	n.p.	n.p.	n.p.	n.p.
295,296	Basic non-ferrous metals	24	n.p.	n.p.	n.p.	n.p.	n.p.
29	Total basic metal products	45	64,535	861	469	74.97	1.45
314	Structural metal products	21	3,346	62	25	54.14	0.71
315	Sheet metal products	28	7,877	134	63	58.70	1.55
316	Other fabricated metal products	76	10,279	183	88	56.17	1.55
31	Total fabricated metal products	125	21,502	379	175	56.73	1.30
323	Motor vehicles and parts	63	107,940	1,298	557	83.13	2.19
324	Other transport equipment	33	18,961	254	63	74.74	1.60

See footnotes at end of table.

TABLE 4. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES(a), AUSTRALIA, 1986-87
BROAD INDICATORS BY INDUSTRY OF ENTERPRISE - continued

Industry of enterprise		Resources devoted to R & D				R & D intensity	
ASIC Code	Description	Enterprises (number)	Expenditure (\$'000)	Human resource effort (person years)	Researcher effort (person years)	Expenditure(b) (\$'000)	Human resource effort(c)(%)
32	Total transport equipment	96	126,901	1,552	620	81.76	2.07
334	Photographic, professional and scientific equipment	64	25,308	426	296	59.37	8.68
3351,	Radio and TV receivers, audio equipment	359	118,219	1,905	1,000	62.05	8.86
3352	and electronic equipment n.e.c.	37	15,792	275	85	57.36	3.12
3353	Refrigerators and household appliances	10	1,824	17	12	105.40	2.30
3354	Water heating systems						
3355-	Cables, batteries and other electrical machinery and equipment n.e.c.	174	36,593	592	290	61.82	2.80
3357	Total appliances and electrical equipment	580	172,429	2,790	1,386	61.81	5.34
3361	Agricultural machinery	42	5,992	141	63	42.49	4.52
3362	Construction machinery	6	n.p.	n.p.	n.p.	n.p.	n.p.
3363	Materials handling equipment	21	n.p.	n.p.	n.p.	n.p.	n.p.
3364-	Other industrial machinery and equipment n.e.c.	173	31,367	504	189	62.21	3.04
3369	Total industrial machinery and equipment	242	41,906	692	273	60.58	3.28
336	Total other machinery and equipment	886	239,642	3,908	1,954	61.33	4.99
33	Total other machinery and equipment						
345,348	Leather, leather products and other manufacturing	28	5,468	93	45	58.80	6.41
346	Rubber products	13	2,738	40	23	69.13	0.82
347	Plastic and related products	55	7,663	113	58	68.05	0.86
34	Total miscellaneous manufacturing	96	15,869	245	125	64.72	1.26
C	TOTAL MANUFACTURING	1,763	685,859	10,120	5,076	67.77	2.07
	Other industries -						
E	Construction	56	9,891	128	69	77.15	0.97
47	Wholesale trade	261	65,572	976	571	67.18	2.03
48	Retail trade	25	2,863	43	24	66.11	0.03
F	Total wholesale and retail trade	286	68,435	1,019	595	67.13	0.53
63	Property and business services	569	170,740	2,245	1,108	76.04	2.44
8461	Research and scientific institutions	79	44,763	636	357	70.39	46.86
(e)	Other n.e.c.	142	158,528	1,872	865	84.67	0.42
16,D-L	TOTAL OTHER INDUSTRIES	1,132	452,357	5,901	2,994	76.66	0.79
	TOTAL ALL INDUSTRIES	2,932	1,189,347	16,368	8,193	72.66	1.27
	Private sector contribution to 'Total all industries' -						
1986-87		2,873	1,068,632	14,998	7,545	71.25	1.66
1984-85		1,938	645,659	11,022	5,389	58.58	1.54

(a) Excludes enterprises in ASIC Division 'A'. (b) Expenditure on R & D per person year of R & D effort. (c) Person-years of effort on R & D expressed as a percentage of the number of persons employed by those enterprises that carried out R & D. (d) ASIC Classes 2751-2752,2761,2764-2780. (e) ASIC codes 16,D,G,H,61-62,J,8141-8306,8462-8495,L.

TABLE 5. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES(a), AUSTRALIA, 1986-87
R & D EXPENDITURE BY INDUSTRY OF ENTERPRISE BY TYPE OF EXPENDITURE, TYPE OF ACTIVITY AND ENTERPRISE EMPLOYMENT SIZE
(\$'000)

Industry of enterprise		Type of expenditure				Type of activity(b)			Employment size(c) (persons)		
ASIC Code	Description	Total	Capital expenditure	Wages and salaries(d)	Other current expenditure	Basic research	Applied research	Experimental development	Less than 200	200 to 499	500 or more
Manufacturing -											
211	Meat products	4,875	233	2,971	1,671	n.p.	n.p.	3,192	n.p.	n.p.	4,476
212	Milk products	15,613	n.p.	4,512	n.p.	n.p.	n.p.	14,762	n.p.	n.p.	14,620
213	Fruit and vegetable products	1,579	n.p.	910	n.p.	24	185	1,370	n.p.	n.p.	n.p.
214,217	Margarine, oils, fats n.e.c. and other food products	19,993	2,876	10,541	6,575	430	5,430	14,133	4,264	2,196	13,533
215,216	Flour mill and cereal food products, bread, cakes and biscuits	8,593	1,008	5,675	1,911	456	2,801	5,336	n.p.	n.p.	7,748
218,219	Beverages, malt and tobacco products	4,328	879	2,658	791	n.p.	n.p.	2,364	n.p.	n.p.	3,756
21	Total food, beverages and tobacco	54,980	5,567	27,266	22,146	1,181	12,642	41,157	5,583	4,474	44,923
234	Textile fibres, yarns and woven fibres	2,295	n.p.	n.p.	801	-	-	-	703	n.p.	n.p.
235,24	Other textile products, clothing and footwear	10,648	n.p.	n.p.	5,925	n.p.	n.p.	8,028	n.p.	n.p.	299
23,24	Total textiles, clothing and footwear	12,943	1,408	4,809	6,727	n.p.	n.p.	10,323	n.p.	n.p.	3,294
25	Wood, wood products and furniture	6,299	839	3,772	1,688	192	2,448	3,659	n.p.	1,414	n.p.
263	Paper and paper products	7,794	1,673	4,186	1,935	n.p.	n.p.	3,575	n.p.	n.p.	n.p.
264	Printing and allied industries	1,573	153	1,112	308	-	680	893	n.p.	n.p.	n.p.
26	Total paper, paper products, printing and publishing	9,367	1,826	5,298	2,243	n.p.	n.p.	4,468	1,271	424	7,672
2753	Synthetic resins and rubber	9,815	448	6,480	2,887	n.p.	n.p.	8,415	2,433	n.p.	n.p.
2754,	Organic and inorganic industrial chemicals n.e.c.	14,036	1,678	7,710	4,648	n.p.	n.p.	8,952	5,764	8,272	-
2762	Paints	9,949	816	7,456	1,677	n.p.	n.p.	7,297	2,536	n.p.	n.p.
2763	Pharmaceutical and veterinary products	43,852	3,845	20,730	19,277	1,825	13,964	28,063	14,790	11,525	17,537
(e)	Other chemical, petroleum and coal products	41,300	3,573	22,442	15,285	1,816	13,670	25,814	7,391	3,381	30,527
27	Total chemical, petroleum and coal products	118,952	10,360	64,818	43,774	3,801	36,611	78,540	32,915	26,446	59,592
287	Cement and concrete products	6,258	1,247	2,147	2,865	n.p.	n.p.	4,276	n.p.	n.p.	n.p.
285,286,	Glass, clay and other non-metallic mineral products	8,611	2,906	3,434	2,271	n.p.	n.p.	6,973	n.p.	n.p.	n.p.
288	Total non-metallic mineral products	14,870	4,152	5,581	5,136	675	2,946	11,249	6,703	2,596	5,571
294	Basic iron and steel	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
295,296	Basic non-ferrous metals	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
29	Total basic metal products	64,535	8,760	34,877	20,898	n.p.	n.p.	32,539	4,049	1,764	58,722
314	Structural metal products	3,346	n.p.	1,596	1,802	n.p.	n.p.	2,541	2,040	n.p.	n.p.
315	Sheet metal products	7,877	n.p.	1,802	1,802	n.p.	n.p.	6,767	1,470	n.p.	n.p.
316	Other fabricated metal products	10,279	1,212	5,655	3,412	148	3,427	6,704	7,211	1,307	1,761
31	Total fabricated metal products	21,502	2,486	12,207	6,809	223	5,267	16,012	10,720	3,008	7,773
323	Motor vehicles and parts	107,940	2,449	54,546	50,946	n.p.	n.p.	100,659	n.p.	n.p.	101,730
324	Other transport equipment	18,961	1,667	9,893	7,400	n.p.	n.p.	17,083	n.p.	n.p.	14,104
32	Total transport equipment	126,901	4,116	64,439	58,346	783	8,376	117,742	7,552	3,515	115,834
334	Photographic, professional and scientific equipment	25,308	2,628	14,094	8,586	178	7,067	18,063	10,943	n.p.	n.p.
3351,	Radio and TV receivers, audio equipment and electronic equipment n.e.c.	118,219	14,723	64,268	39,229	1,851	39,171	77,197	66,318	6,290	45,611
3352	Refrigerators and household appliances	15,792	n.p.	n.p.	5,736	n.p.	n.p.	14,331	6,143	n.p.	n.p.
3353											
See footnotes at end of table											

See footnotes at end of table.

TABLE 5. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES(a), AUSTRALIA, 1986-87
R & D EXPENDITURE BY INDUSTRY OF ENTERPRISE BY TYPE OF EXPENDITURE, TYPE OF ACTIVITY AND ENTERPRISE EMPLOYMENT SIZE
(\$'000) - continued

Industry of enterprise		Type of expenditure				Type of activity(b)			Employment size(c) (persons)		
ASIC Code	Description	Total	Capital expenditure	Wages and salaries(d)	Other current expenditure	Basic research	Applied research	Experimental development	Less than 200	200 to 499	500 or more
3354	Water heating systems	1,824	n.p.	n.p.	1,033	n.p.	n.p.	1,333	1,652	n.p.	n.p.
3355-3357	Cables, batteries and other electrical machinery and equipment n.e.c.	36,593	3,278	20,174	13,141	246	13,083	23,264	16,451	2,404	17,739
335	Total appliances and electrical equipment	172,429	18,295	94,995	59,139	2,161	54,142	116,125	90,563	11,910	69,956
3361	Agricultural machinery	5,992	400	4,014	1,577	79	714	5,199	3,184	n.p.	n.p.
3362	Construction machinery	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
3363	Materials handling equipment	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
3364-3369	Other industrial machinery and equipment n.e.c.	31,367	4,134	16,457	10,776	437	7,395	23,535	22,179	n.p.	n.p.
336	Total industrial machinery and equipment	41,906	4,909	21,804	15,193	586	8,719	32,601	29,910	n.p.	n.p.
33	Total other machinery and equipment	239,642	25,832	130,892	82,918	2,926	69,927	166,789	131,416	30,883	77,344
345,348	Leather, leather products and other manufacturing	5,468	877	2,764	1,828	n.p.	n.p.	4,176	5,396	n.p.	n.p.
346	Rubber products	2,738	372	1,554	812	n.p.	n.p.	1,798	527	n.p.	n.p.
347	Plastic and related products	7,663	1,645	4,090	1,927	n.p.	n.p.	5,534	3,473	992	3,198
34	Total miscellaneous manufacturing	15,869	2,894	8,408	4,567	333	4,028	11,507	9,396	1,169	5,304
C	TOTAL MANUFACTURING	685,859	68,239	362,367	255,253	13,374	178,498	493,987	220,453	78,985	386,420
Other industries -											
E	Construction	9,891	1,838	4,585	3,468	176	2,324	7,392	n.p.	n.p.	2,724
47	Wholesale trade	65,572	7,085	34,980	23,507	798	19,190	45,584	44,280	n.p.	n.p.
48	Retail trade	2,863	673	1,369	820	54	1,350	1,459	2,127	n.p.	n.p.
F	Total wholesale and retail trade	68,435	7,759	36,349	24,327	851	20,540	47,043	46,406	8,322	13,707
63	Property and business services	170,740	22,241	83,540	64,959	3,004	58,678	109,058	111,790	5,431	53,519
8461	Research and scientific institutions	44,763	6,095	21,467	17,202	3,068	24,202	17,493	n.p.	n.p.	-
(f)	Other n.e.c.	209,659	51,974	95,659	62,027	1,550	100,864	107,246	19,338	18,456	171,865
16,D-L	TOTAL OTHER INDUSTRIES	503,489	89,906	241,601	171,982	8,649	206,607	288,232	220,235	41,439	241,815
	TOTAL ALL INDUSTRIES	1,189,347	158,145	603,967	427,235	22,023	385,105	782,219	440,688	120,424	628,235
Private sector contribution to 'Total all industries' -											
1986-87		1,068,632	129,584	546,902	392,147	19,826	320,207	728,599	n.p.	n.p.	515,920
1984-85		645,659	89,341	353,668	202,649	15,409	178,064	452,186	200,755	82,878	362,026

(a) Excludes enterprises in ASIC Division 'A'. (b) Data within this classification are subjectively allocated by respondents at the time of reporting, using OECD/ABS definitions. Analysts using this classification should bear the original subjectivity in mind. See Paragraph 20 of the Explanatory Notes. (c) Employment size is based on the no. of persons employed by the enterprise. (d) Includes other labour costs in overtime earnings, shift allowances, penalty rates, bonuses, commission payments, holiday pay, long service leave payments, employer contributions to superannuation and pension schemes. (e) ASIC Classes 2751-2752, 2761, 2764-2780. (f) ASIC Codes 11-16, D, G, H, 61-62, J, 8141-8306, 8462-8495, L.

TABLE 6. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES(a), AUSTRALIA, 1986-87
R & D EXPENDITURE BY INDUSTRY OF ENTERPRISE BY SOURCE OF FUNDS
(\$'000)

Industry of enterprise		Source of funds							
ASIC Code	Description	Total	Own funds	GIRD Scheme(b)	Other Commonwealth Government	State and Local Government	Other business enterprises	Private non-profit and other Australian(c),(d)	Overseas
Manufacturing -									
21	Food, beverages and tobacco	54,980	53,334	504	348	n.p.	n.p.	-	n.p.
23-24	Textiles, clothing and footwear	12,943	12,861	n.p.	-	n.p.	n.p.	-	-
25	Wood, wood products and furniture	6,299	6,210	68	n.p.	n.p.	n.p.	-	-
26	Paper, paper products, printing and publishing	9,367	9,171	n.p.	-	-	n.p.	-	-
27	Chemical, petroleum and coal products	118,952	106,236	2,762	-	-	n.p.	-	-
28	Non-metallic mineral products	14,870	14,632	130	n.p.	n.p.	3,778	n.p.	648
29	Basic metal products	64,535	61,513	749	n.p.	-	n.p.	-	-
31	Fabricated metal products	21,502	20,029	607	n.p.	n.p.	n.p.	-	-
32	Transport equipment	126,901	118,042	449	n.p.	-	n.p.	-	-
334	Photographic, professional and scientific equipment	25,308	23,862	610	466	-	n.p.	n.p.	n.p.
335	Appliances and electrical equipment	172,429	146,002	4,380	6,314	n.p.	14,147	-	n.p.
336	Industrial machinery and equipment	41,906	35,724	2,648	1,297	n.p.	1,983	n.p.	394
34	Miscellaneous manufacturing	15,869	14,668	610	382	-	209	-	n.p.
C	TOTAL MANUFACTURING	685,859	622,283	13,657	23,619	1,310	22,388	108	2,493
Other industries -									
F	Wholesale and retail trade	68,435	56,067	2,348	599	78	3,249	-	6,094
63	Property and business services	170,740	139,558	3,406	3,491	1,581	18,744	n.p.	n.p.
8461	Research and scientific institutions	44,763	15,344	3,252	6,322	n.p.	17,948	n.p.	n.p.
(d)	Other n.e.c.	219,550	209,012	876	4,501	n.p.	4,016	n.p.	-
11-16, D-L	TOTAL OTHER INDUSTRIES	503,489	419,981	9,882	14,913	2,909	43,956	585	11,262
TOTAL ALL INDUSTRIES		1,189,347	1,042,264	23,540	38,532	4,219	66,344	693	13,755
Private sector contribution to 'Total all industries' -									
1986-87		1,068,632	931,943	22,989	30,418	n.p.	65,611	n.p.	13,755
1984-85		645,659	529,251	40,178	22,636	2,948	n.p.	n.p.	12,741
(a) Excludes enterprises in ASIC Division 1A - 1A.9									

(a) Excludes enterprises in ASIC Division 'A'. (b) Grants for Industry Research and Development Scheme. (c) Includes Higher Education Sector. (d) Funding details are not comparable to those for previous years. Please contact the ABS for details. (e) ASIC Codes 16,D,E,G,H,I,61-62,J,8141-8306,8462-8495,L. (d) ASIC Classes 2751-2752,2761,2764-2780.

TABLE 7. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA(a), 1986-87
HUMAN RESOURCES DEVOTED TO R & D BY INDUSTRY OF ENTERPRISE BY TYPE OF EMPLOYEE AND ENTERPRISE EMPLOYMENT SIZE
(person-years)

Industry of enterprise	ASIC Code Description	Type of employee				Employment size(b) (persons)		
		Total	Researchers	Technicians	Other supporting staff	Less than 200	200 to 499	500 or more
	<i>Mining -</i>							
	11 Metallic minerals	270	92	n.p.	n.p.	6	n.p.	n.p.
	12-15 Non-metallic minerals	76	32	n.p.	n.p.	3	n.p.	n.p.
	11-15 TOTAL MINING (excluding services to mining)	347	124	182	41	9	40	298
	<i>Manufacturing -</i>							
	211 Meat products	96	31	43	22	n.p.	n.p.	88
	212 Milk products	143	82	29	32	n.p.	n.p.	128
	213 Fruit and vegetable products	31	17	10	4	n.p.	12	n.p.
	214,217 Margarine, oils, fats n.e.c. and other food products	267	143	87	37	56	34	178
	215,216 Flour mill and cereal food products, bread, cakes and biscuits	170	102	43	26	7	8	155
	218,219 Beverages, malt and tobacco products	71	31	35	5	n.p.	n.p.	n.p.
	21 Total food, beverages and tobacco	778	405	246	126	84	69	624
	234 Textile fibres, yarns and woven fibres	42	14	n.p.	n.p.	9	n.p.	n.p.
	235,24 Other textile products, clothing and footwear	78	53	n.p.	n.p.	39	n.p.	n.p.
	23,24 Total textiles, clothing and footwear	119	67	31	22	48	31	41
	25 Wood, wood products and furniture	118	54	47	17	64	30	24
	263 Paper and paper products	120	59	47	15	n.p.	n.p.	n.p.
	264 Printing and allied industries	36	22	11	3	n.p.	n.p.	n.p.
	26 Total paper, paper products, printing and publishing	156	80	58	18	29	7	120
	2753 Synthetic resins and rubber	176	107	50	19	51	n.p.	n.p.
	2754, Organic and inorganic industrial chemicals n.e.c.	192	115	47	30	83	109	.
	2762 Paints	248	153	69	26	58	n.p.	n.p.
	2763 Pharmaceutical and veterinary products	617	316	196	105	196	172	249
	(c) Other chemical, petroleum and coal products	601	371	147	83	136	59	406
	27 Total chemical, petroleum and coal products	1,832	1,061	510	262	524	412	896
	287 Cement and concrete products	65	23	25	18	n.p.	20	n.p.
	285,286 Glass, clay and other non-metallic mineral products	107	43	29	34	n.p.	9	n.p.
	28 Total non-metallic mineral products	172	66	55	52	63	29	80
	294 Basic iron and steel	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
	295,296 Basic non-ferrous metals	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
	29 Total basic metal products	861	469	240	152	60	18	783
	314 Structural metal products	62	25	21	16	33	n.p.	n.p.
	315 Sheet metal products	134	63	42	29	28	n.p.	n.p.
	316 Other fabricated metal products	183	88	58	38	120	27	37
	31 Total fabricated metal products	379	175	121	83	181	55	144
	323 Motor vehicles and parts	1,298	557	518	224	n.p.	n.p.	1,153

See footnotes at end of table.

TABLE 7. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA(a), 1986-87
HUMAN RESOURCES DEVOTED TO R & D BY INDUSTRY OF ENTERPRISE BY TYPE OF EMPLOYEE AND ENTERPRISE EMPLOYMENT SIZE
(person-years) - continued

Industry of enterprise		Type of employee				Employment size(b) (persons)		
ASIC Code	Description	Total	Researchers	Technicians	Other supporting staff	Less than 200	200 to 499	500 or more
324	Other transport equipment	254	63	74	118	n.p.	n.p.	185
32	Total transport equipment	1,552	620	591	341	126	88	1,338
334	Photographic, professional and scientific equipment	426	296	78	53	173	n.p.	n.p.
3351,	Radio and TV receivers, audio equipment							
3352	and electronic equipment n.e.c.	1,905	1,000	620	285	1,147	88	671
3353	Refrigerators and household appliances	275	85	n.p.	n.p.	66	n.p.	n.p.
3354	Water heating systems	17	12	n.p.	n.p.	14	n.p.	n.p.
3355-	Cables, batteries and other electrical							
3357	machinery and equipment n.e.c.	592	290	224	79	302	41	249
335	Total appliances and electrical equipment	2,790	1,386	979	425	1,528	213	1,049
3361	Agricultural machinery	141	63	38	40	76	n.p.	n.p.
3362	Construction machinery	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
3363	Materials handling equipment	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
3364-	Other industrial machinery and							
3369	equipment n.e.c.	504	189	177	138	335	97	72
336	Total industrial machinery and equipment	692	273	233	186	457	n.p.	n.p.
33	Total other machinery and equipment	3,908	1,954	1,290	664	2,159	583	1,166
345,348	Leather, leather products and other manufacturing	93	45	36	12	92	n.p.	n.p.
346	Rubber products	40	23	14	3	11	n.p.	n.p.
347	Plastic and related products	113	58	41	14	60	21	32
34	Total miscellaneous manufacturing	245	125	91	29	162	25	58
C	TOTAL MANUFACTURING	10,120	5,076	3,279	1,766	3,500	1,348	5,272
Other industries -								
E	Construction	128	69	37	22	n.p.	n.p.	44
47	Wholesale trade	976	571	270	135	663	n.p.	n.p.
48	Retail trade	43	24	13	7	35	n.p.	n.p.
F	Total wholesale and retail trade	1,019	595	283	142	698	146	176
63	Property and business services	2,245	1,108	815	322	1,597	82	566
8461	Research and scientific institutions	636	357	174	105	n.p.	n.p.	-
(d)	Other n.e.c.	1,872	865	698	309	185	110	1,577
16,D-L	TOTAL OTHER INDUSTRIES	5,901	2,994	2,007	900	3,041	497	2,363
	TOTAL ALL INDUSTRIES	16,368	8,193	5,468	2,706	6,550	1,885	7,934
Private sector contribution to 'Total all industries' -								
1986-87		14,998	7,545	5,007	2,446	n.p.	n.p.	6,649
1984-85		11,022	5,389	3,964	1,669	3,700	1,490	5,832

(a) Excludes enterprises in ASIC Division 'A' (b) Employment size is based on the number of persons employed by the enterprise, whereas human resources data are person years of R & D effort. (c) ASIC Classes 2751-2752,2761,2764-2780. (d) ASIC Codes 16,D,G,H,61-62,J,8141-8306,8462-8495,L

TABLE 8. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES(a), AUSTRALIA, 1986-87
RESEARCHER EFFORT BY INDUSTRY OF ENTERPRISE BY LOCATION (b)
(person-years)

Industry of enterprise		Location						
ASIC Code	Description	Total	N.S.W.	Vic.	Qld.	W.A.	Other Australian states and territories	Overseas
<i>Manufacturing -</i>								
21	Food, beverages and tobacco	405	184	167	39	n.p.	7	4
23-24	Textiles, clothing and footwear	67	29	34	n.p.	n.p.	n.p.	n.p.
25	Wood, wood products and furniture	54	23	8	9	9	n.p.	n.p.
26	Paper, paper products, printing and publishing	80	7	35	n.p.	n.p.	7	n.p.
27	Chemical, petroleum and coal products	1,061	340	575	52	37	38	13
28	Non-metallic mineral products	66	37	n.p.	3	3	5	n.p.
29	Basic metal products	469	140	n.p.	23	n.p.	56	n.p.
31	Fabricated metal products	175	68	72	12	8	15	n.p.
32	Transport equipment	620	82	444	23	n.p.	62	n.p.
334	Photographic, professional and scientific equipment	296	168	110	10	n.p.	4	n.p.
335	Appliances and electrical equipment	1,386	533	519	57	99	132	43
336	Industrial machinery and equipment	273	92	97	36	23	18	7
34	Miscellaneous manufacturing	125	55	48	5	7	10	n.p.
C	TOTAL MANUFACTURING	5,076	1,758	2,333	273	229	353	116
<i>Other industries -</i>								
F	Wholesale and retail trade	595	275	157	71	12	24	n.p.
63	Property and business services	1,108	384	357	94	101	133	n.p.
8461	Research and scientific institutions	357	201	34	48	12	34	24
(c)	Other n.e.c.	1,059	429	391	120	53	40	24
11-16, D-L	TOTAL OTHER INDUSTRIES	3,118	1,289	940	334	178	231	126
	TOTAL ALL INDUSTRIES	8,193	3,047	3,274	607	407	584	243
<i>Private sector contribution to 'Total all industries'.</i>								
1986-87		7,545	2,868	2,895	573	389	550	239
1984-85		5,389	2,065	2,182	395	232	360	137

(a) Excludes enterprises in ASIC Division 'A' (b) Location of the researcher effort. (c) ASIC Codes 11-16, D, E, G, H, 61-62, J, 8141-8306, 8462-8495, L.

TABLE 9. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES(a), AUSTRALIA, 1986-87
R & D EXPENDITURE BY INDUSTRY OF ENTERPRISE BY R & D EXPENDITURE SIZE

Industry of enterprise		R & D expenditure size (\$'000)									
		Total		Less than 20		20 to 49		50 to 499		500 or more	
		Enterprises (number)	R & D Expenditure (\$'000)	Enterprises (number)	R & D Expenditure (\$'000)	Enterprises (number)	R & D Expenditure (\$'000)	Enterprises (number)	R & D Expenditure (\$'000)	Enterprises (number)	R & D Expenditure (\$'000)
ASIC Code	Description										
11-15	MINING (excluding services to mining)	37	51,132	3	34	3	109	18	4,049	13	46,939
	<i>Manufacturing -</i>										
21	Food, beverages and tobacco	99	54,980	6	58	11	370	54	8,508	28	46,044
23-24	Textiles, clothing and footwear	35	12,943	4	57	6	200	22	3,071	3	9,616
25	Wood, wood products and furniture	46	6,299	5	n.p.	9	n.p.	29	3,625	3	2,285
26	Paper, paper products, printing and publishing	31	9,367	1	n.p.	8	n.p.	17	2,353	5	6,761
27	Chemical, petroleum and coal products	267	118,952	56	482	47	1,466	117	21,472	47	95,532
28	Non-metallic mineral products	37	14,870	3	29	6	217	21	3,385	7	11,239
29	Basic metal products	45	64,535	3	37	8	277	21	3,532	13	60,689
31	Fabricated metal products	125	21,502	18	174	23	772	79	12,350	5	8,206
32	Transport equipment	96	126,901	7	58	14	453	53	7,932	22	118,458
334	Photographic, professional and scientific equipment	64	25,308	13	79	13	428	29	4,325	9	20,476
335	Appliances and electrical equipment	580	172,429	100	950	113	3,678	302	46,207	65	121,595
336	Industrial machinery and equipment	242	41,906	34	371	53	1,809	138	20,243	17	19,482
34	Miscellaneous manufacturing	96	15,869	17	187	19	669	53	6,596	7	8,417
C	TOTAL MANUFACTURING	1,763	685,859	267	2,547	330	10,915	935	143,597	231	528,799
	<i>Other industries -</i>										
F	Wholesale and retail trade	286	68,435	41	413	62	2,016	152	23,911	31	42,095
63	Property and business services	569	170,740	126	1,198	117	3,821	268	43,037	58	122,685
8461	Research and scientific institutions	79	44,763	10	90	7	215	43	7,088	19	37,370
(b)	Other n.e.c.	198	168,419	36	345	30	1,034	93	17,362	39	149,677
16, D-L	TOTAL OTHER INDUSTRIES	1,132	452,357	213	2,046	216	7,086	556	91,398	147	351,827
	TOTAL ALL INDUSTRIES	2,932	1,189,347	483	4,628	549	18,110	1,509	239,044	391	927,566
	<i>Private sector contribution to 'Total all industries' -</i>										
	1986-87	2,873	1,068,632	478	4,575	541	17,855	1,483	233,632	371	812,571
	1984-85	1,938	645,659	407	3,872	410	13,525	888	136,014	233	492,248

(a) Excludes enterprises in ASIC Division 'A'. (b) ASIC Codes 16,D,E,G-H,61-62,J,8141-8306,8462-8495,L.

TABLE 10. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES(a), AUSTRALIA, 1986-87
R & D EXPENDITURE BY R & D EXPENDITURE SIZE

Expenditure size (\$'000)	Total all industries		Manufacturing		Mining and other industries	
	Enterprises (number)	R & D Expenditure (\$'000)	Enterprises (number)	R & D Expenditure (\$'000)	Enterprises (number)	R & D Expenditure (\$'000)
Less than 20	483	4,628	267	2,547	216	2,081
20 to 49	549	18,110	330	10,915	219	7,195
50 to 99	610	42,983	392	27,670	218	15,314
100 to 199	498	67,862	304	41,457	194	26,404
200 to 499	401	128,199	239	74,470	162	53,729
500 to 999	183	125,539	113	78,595	70	46,944
1000 to 1999	109	150,074	59	80,474	50	69,600
2000 to 4999	67	206,430	39	113,764	28	92,666
5000 to 9999	20	144,959	13	90,767	7	54,192
10000 or more	12	300,564	7	165,199	5	135,365
Total	2,932	1,189,347	1,763	685,859	1,169	503,489

(a) Excludes enterprises in ASIC Division 'A'.

TABLE 11. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES(a), AUSTRALIA, 1986-87
NUMBER OF ENTERPRISES PERFORMING R & D BY INDUSTRY OF ENTERPRISE BY ENTERPRISE EMPLOYMENT SIZE(b)
(number)

Industry of enterprise		Enterprise employment size (persons)								
ASIC Code	Description	Total	Less than 10	10 to 19	20 to 49	50 to 99	100 to 199	200 to 499	500 to 999	1000 or more
Manufacturing -										
21	Food, beverages and tobacco	99	6	5	8	7	13	21	16	23
23-24	Textiles, clothing and footwear	35	1	1	7	7	6	7	3	3
25	Wood, wood products and furniture	46	4	6	10	7	7	9	1	2
26	Paper, paper products, printing and publishing	31	7	3	1	-	4	6	4	6
27	Chemical, petroleum and coal products	267	70	35	51	26	31	36	12	6
28	Non-metallic mineral products	37	9	3	2	3	2	8	9	1
29	Basic metal products	45	8	4	1	7	7	6	4	8
31	Fabricated metal products	125	24	16	30	20	11	11	7	6
32	Transport equipment	96	20	7	15	8	7	8	17	14
334	Photographic, professional and scientific equipment	64	37	6	8	3	6	3	-	1
335	Appliances and electrical equipment	580	257	102	96	48	32	20	10	15
336	Industrial machinery and equipment	242	72	41	49	34	21	18	5	2
34	Miscellaneous manufacturing	96	22	19	22	13	6	8	3	3
C	TOTAL MANUFACTURING	1,763	537	248	300	183	153	161	91	90
Other industries -										
F	Wholesale and retail trade	286	77	59	58	33	18	22	5	14
63	Property and business services	569	328	99	68	30	12	15	8	9
8461	Research and scientific institutions	79	50	14	10	2	2	1	-	-
(c)	Other n.e.c.	235	65	15	23	14	18	25	19	56
11-16, D-L	TOTAL OTHER INDUSTRIES	1,169	520	187	159	79	50	63	32	79
TOTAL ALL INDUSTRIES		2,932	1,057	435	459	262	203	224	123	169
Private sector contribution to 'Total all industries' -										
1986-87		2,873	1,056	433	455	259	195	220	118	137
1984-85		1,938	632	275	296	173	142	196	93	131

(a) Excludes enterprises in ASIC Division 'A'. (b) Employment size is based on the number of persons employed by the enterprise. (c) ASIC Codes 11-16, D, E, G, H, 61-62, J, 8141-8306, 8462-8495, L.

TABLE 12. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES(a), AUSTRALIA, 1986-87
R & D EXPENDITURE BY INDUSTRY OF ENTERPRISE BY ENTERPRISE EMPLOYMENT SIZE(b)
(\$'000)

Industry of enterprise			Enterprise employment size (persons)								
ASIC Code	Description	Total	Less than 10	10 to 19	20 to 49	50 to 99	100 to 199	200 to 499	500 to 999	1000 or more	
<i>Manufacturing -</i>											
21	Food, beverages and tobacco	54,980	334	1,170	1,473	1,326	1,280	4,474	10,970	33,953	
23-24	Textiles, clothing and footwear	12,943	n.p.	n.p.	n.p.	467	567	3,294	n.p.	n.p.	
25	Wood, wood products and furniture	6,299	249	482	776	445	1,056	1,414	n.p.	n.p.	
26	Paper, paper products, printing and publishing	9,367	n.p.	605	n.p.	-	405	424	1,083	6,589	
27	Chemical, petroleum and coal products	118,952	4,193	2,945	10,201	3,347	12,229	26,446	16,456	43,136	
28	Non-metallic mineral products	14,870	1,433	451	n.p.	n.p.	n.p.	2,596	n.p.	n.p.	
29	Basic metal products	64,535	1,556	n.p.	n.p.	1,564	n.p.	1,764	2,293	56,428	
31	Fabricated metal products	21,502	2,848	1,970	2,125	1,901	1,875	3,008	1,531	6,242	
32	Transport equipment	126,901	1,426	1,253	2,441	619	1,814	3,515	8,420	107,414	
334	Photographic, professional and scientific equipment	25,308	2,947	n.p.	2,656	n.p.	4,103	n.p.	-	n.p.	
335	Appliances and electrical equipment	172,429	16,305	15,986	33,168	12,594	12,511	11,910	7,338	62,618	
336	Industrial machinery and equipment	41,906	4,739	3,704	7,835	6,616	7,017	n.p.	n.p.	n.p.	
34	Miscellaneous manufacturing	15,869	1,297	1,215	3,375	2,944	565	1,169	2,871	2,433	
C	TOTAL MANUFACTURING	685,859	37,687	30,618	73,442	34,076	44,630	78,985	56,042	330,379	
<i>Other industries -</i>											
F	Wholesale and retail trade	68,435	5,313	6,280	13,792	12,765	8,257	8,322	2,205	11,502	
63	Property and business services	170,740	22,098	22,179	29,084	16,278	22,151	5,431	8,127	45,392	
8461	Research and scientific institutions	44,763	7,251	7,917	8,405	n.p.	n.p.	n.p.	-	-	
(c)	Other n.e.c.	219,550	7,396	6,202	5,829	n.p.	n.p.	n.p.	15,160	159,429	
11-16, D-L	TOTAL OTHER INDUSTRIES	503,489	42,057	42,578	57,110	36,562	41,929	41,439	25,492	216,323	
TOTAL ALL INDUSTRIES		1,189,347	79,744	73,196	130,552	70,638	86,559	120,424	81,534	546,701	
<i>Private sector contribution to 'Total all industries' -</i>											
1986-87		1,068,632	79,683	73,157	130,262	n.p.	n.p.	n.p.	72,477	443,443	
1984-85		645,659	32,038	n.p.	47,584	n.p.	47,929	82,878	62,764	299,263	

(a) Excludes enterprises in ASIC Division 'A'. (b) Employment size is based on the number of persons employed by the enterprise. (c) ASIC Codes 11-16, D, E, G, H, 61-62, J, 81, 41-8306, 8462-8495, L.

TABLE 13. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES(a), AUSTRALIA, 1986-87
HUMAN RESOURCES DEVOTED TO R & D BY INDUSTRY OF ENTERPRISE BY ENTERPRISE EMPLOYMENT SIZE(b)
(person years)

Industry of enterprise		Enterprise employment size (persons)							
ASIC Code	Description	Total	Less than 10	10 to 19	20 to 49	50 to 99	100 to 199	200 to 499	500 to 999 1000 or more
<i>Manufacturing -</i>									
21	Food, beverages and tobacco	778	4	22	12	19	28	69	161
23-24	Textiles, clothing and footwear	119	n.p.	n.p.	n.p.	9	12	31	n.p.
25	Wood, wood products and furniture	118	6	12	16	11	19	30	n.p.
26	Paper, paper products, printing and publishing	156	n.p.	15	n.p.	-	9	7	12
27	Chemical, petroleum and coal products	1,832	63	51	146	72	192	412	281
28	Non-metallic mineral products	172	9	n.p.	n.p.	n.p.	n.p.	29	n.p.
29	Basic metal products	861	11	n.p.	n.p.	35	n.p.	18	25
31	Fabricated metal products	379	34	25	45	47	30	55	30
32	Transport equipment	1,552	26	18	40	17	25	88	173
334	Photographic, professional and scientific equipment	426	43	n.p.	41	n.p.	64	n.p.	-
335	Appliances and electrical equipment	2,790	298	279	507	226	220	213	126
336	Industrial machinery and equipment	692	88	69	135	68	97	n.p.	n.p.
34	Miscellaneous manufacturing	245	26	22	45	62	7	25	22
C	TOTAL MANUFACTURING	10,120	613	533	1,037	604	713	1,348	935
<i>Other industries -</i>									
F	Wholesale and retail trade	1,019	94	102	214	176	111	146	37
63	Property and business services	2,245	404	313	344	258	279	82	128
8461	Research and scientific institutions	636	98	97	147	n.p.	n.p.	n.p.	-
(c)	Other n.e.c.	2,347	80	33	58	n.p.	n.p.	n.p.	141
11-16, D-L	TOTAL OTHER INDUSTRIES	6,248	676	545	762	536	532	536	306
	TOTAL ALL INDUSTRIES	16,368	1,289	1,077	1,799	1,140	1,244	1,885	1,242
<i>Private sector contribution to 'Total all industries' -</i>									
1986-87		14,998	1,287	1,076	1,793	n.p.	n.p.	n.p.	1,200
1984-85		11,022	681	n.p.	831	n.p.	862	1,490	n.p.

(a) Excludes enterprises in ASIC Division 'A'. (b) Employment size is based on the number of persons employed by the enterprise, whereas human resources data are person years of R & D effort (c) ASIC Codes 11-16,D,E,G-H,61-62,J,8141-8306,8462-8495,L.

TABLE 14. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES(a), AUSTRALIA, 1986-87
HUMAN RESOURCES DEVOTED TO R & D AS A PERCENTAGE OF ENTERPRISE EMPLOYMENT BY INDUSTRY OF
ENTERPRISE BY ENTERPRISE EMPLOYMENT SIZE(b)

Industry of enterprise			Enterprise employment size (persons)							
ASIC Code	Description	Total	Less than 10	10 to 19	20 to 49	50 to 99	100 to 199	200 to 499	500 to 999	1000 or more
Manufacturing -										
21	Food, beverages and tobacco	0.82	10.59	20.87	4.96	3.39	0.99	0.76	1.49	0.65
23-24	Textiles, clothing and footwear	0.98	n.p.	n.p.	n.p.	1.80	0.97	1.21	n.p.	n.p.
25	Wood, wood products and furniture	1.10	41.43	14.57	4.66	2.00	1.62	0.88	n.p.	n.p.
26	Paper, paper products, printing and publishing	0.31	n.p.	28.85	n.p.	-	1.88	0.28	0.29	0.25
27	Chemical, petroleum and coal products	3.82	16.94	9.26	8.13	3.36	3.68	3.27	2.71	4.12
28	Non-metallic mineral products	1.50	21.67	n.p.	n.p.	n.p.	n.p.	1.23	n.p.	n.p.
29	Basic metal products	1.45	32.57	n.p.	n.p.	6.33	n.p.	0.72	0.70	1.47
31	Fabricated metal products	1.30	25.07	10.81	4.18	3.07	1.75	1.42	0.55	0.75
32	Transport equipment	2.07	27.40	17.16	7.05	3.06	2.23	3.08	1.51	2.00
334	Photographic, professional and scientific equipment	8.68	26.50	n.p.	13.78	n.p.	6.95	n.p.	-	n.p.
335	Appliances and electrical equipment	5.34	24.94	19.59	16.56	6.55	4.73	3.69	1.75	3.62
336	Industrial machinery and equipment	3.28	23.98	11.54	8.51	3.05	2.72	n.p.	n.p.	n.p.
34	Miscellaneous manufacturing	1.26	18.00	8.94	5.76	5.56	0.69	0.81	0.81	0.35
C	TOTAL MANUFACTURING	2.07	23.15	14.93	10.23	4.40	2.81	2.34	1.38	1.41
Other industries -										
F	Wholesale and retail trade	0.53	21.51	11.19	10.95	6.42	3.52	1.57	1.07	0.08
63	Property and business services	2.44	29.64	21.96	15.98	11.68	14.77	1.69	2.02	0.61
8461	Research and scientific institutions	46.86	44.25	46.44	47.20	n.p.	n.p.	n.p.	-	-
(c)	Other n.e.c.	0.46	23.99	9.88	6.34	n.p.	n.p.	n.p.	0.80	0.37
11-16, D-L	TOTAL OTHER INDUSTRIES	0.78	28.70	18.91	14.32	8.59	6.17	2.27	1.11	0.33
TOTAL ALL INDUSTRIES		1.27	25.76	16.70	11.63	5.71	3.66	2.32	1.31	0.65

(a) Excludes enterprises in ASIC Division 'A'. (b) Employment size is based on the number of persons employed by the enterprise, whereas human resources data are person years of R & D effort (c) ASIC Codes 11-16, D, E, G, H, 61-62, 1, 8141-8306, 8462-8495, L.

TABLE 15. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES(a), AUSTRALIA, 1986-87
RESEARCHER EFFORT BY INDUSTRY OF ENTERPRISE BY LOCATION (b)
(person years)

Industry of enterprise		Location										
ASIC Code	Description	Total	N.S.W.	Vic.	Qld.	W.A.	S.A.	Tas.	N.T.	A.C.T.	Ext. Terr.	Overseas
C	Manufacturing	5,076	1,758	2,333	273	229	353	72	4	41	-	12
B,D-L	Mining and other industries	3,118	1,289	940	334	178	231	31	7	88	-	20
TOTAL ALL INDUSTRIES		8,193	3,047	3,274	607	407	584	103	11	129	-	32
Private sector contribution to 'Total all industries' -												
	1986-87	7,545	2,868	2,895	573	389	550	100	10	129	-	32
	1984-85	5,389	2,065	2,182	395	232	360	91	5	41	-	18

(a) Excludes enterprises in ASIC Division 'A'. (b) Location of the researcher effort.

TABLE 16. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES(a), AUSTRALIA
R & D EXPENDITURE BY INDUSTRY OF PRODUCT FIELD (b)

Industry of product field		1984-85 ^r		1986-87	
ASIC Code	Description	Enterprises(c) (number)	R & D expenditure (\$'000)	Enterprises(c) (number)	R & D expenditure (\$'000)
<i>Agriculture, forestry, fishing and hunting -</i>					
012,018	Poultry, cereal grains, sheep, cattle and pigs	8	2,336	10	3,606
013-014, 019-04	Other agriculture, forestry, fishing and hunting	21	2,318	41	7,897
A	TOTAL AGRICULTURE, FORESTRY, FISHING AND HUNTING	28	4,654	51	11,503
<i>Mining -</i>					
11	Metallic minerals	21	13,468	23	36,345
12-15	Non-metallic minerals	32	24,595	26	24,779
11-15	TOTAL MINING (excluding services to mining)	52	38,063	44	61,124
<i>Manufacturing -</i>					
211	Meat products	9	1,446	17	3,145
212	Milk products	20	3,753	15	12,460
213	Fruit and vegetable products	12	1,721	16	969
214,217	Margarine, oils, fats n.e.c. and other food products	62	13,434	69	21,984
215,216	Flour mill and cereal food products, bread, cakes and biscuits	24	5,908	15	7,845
218,219	Beverages, malt and tobacco products	17	4,802	17	4,312
21	Total food, beverages and tobacco	111	31,064	127	50,714
234	Textile fibres, yarns and woven fibres	6	720	13	1,548
235,24	Other textile products, clothing and footwear	20	1,978	34	4,909
23,24	Total textiles, clothing and footwear	26	2,698	47	6,457
25	Wood, wood products and furniture	36	3,485	64	5,982
263	Paper and paper products	18	6,305	23	n.p.
264	Printing and allied industries	7	1,896	3	n.p.
26	Total paper, paper products, printing and publishing	25	8,201	26	7,735
2751	Chemical fertilizers	7	1,154	14	2,686
2753	Synthetic resins and rubber	45	8,625	55	18,544
2754	Organic industrial chemicals n.e.c.	47	9,345	41	7,967
2755	Inorganic industrial chemicals n.e.c.	24	5,868	51	12,614
2762	Paints	53	11,469	61	11,296
2763	(Veterinary products	26	14,603	31	17,344
	(Pharmaceutical products	49	21,826	79	44,010
2764	Pesticides	31	9,796	29	15,760
2765	Soap and other detergents	29	3,458	36	3,918
2766	Cosmetics and toilet preparations	17	2,539	22	2,447
2767	Inks	6	1,482	12	1,835
2752,2761, 2768	Industrial gases, ammunition and other chemical products	46	9,444	93	17,690

See footnotes at end of table.

TABLE 16. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES(a), AUSTRALIA
R & D EXPENDITURE BY INDUSTRY OF PRODUCT FIELD (b)-Continued

Industry of product field		1984-85		1986-87	
ASIC Code	Description	Enterprises(c) (number)	R & D expenditure (\$'000)	Enterprises(c) (number)	R & D expenditure (\$'000)
275,276	Total basic chemicals and other chemical products				
277,278	Petroleum refining, petroleum and coal products n.e.c.	277	99,608	421	156,111
27	Total chemical, petroleum and coal products	24	2,538	37	6,815
285	Glass and glass products	292	102,147	444	162,927
286	Clay products and refractories	5	923	6	574
287	Cement and concrete products	18	5,354	29	11,664
288	Other non-metallic mineral products	23	3,413	29	4,579
28	Total non-metallic mineral products	22	3,762	28	4,773
294	Basic iron and steel	63	13,451	82	21,590
295,296	Basic non-ferrous metals	43	20,771	69	45,494
29	Total basic metal products	40	19,236	55	39,195
314	Structural metal products	81	40,006	120	84,689
315	Sheet metal products	44	5,263	63	12,033
316	Other fabricated metal products	29	2,261	35	2,909
31	Total fabricated metal products	100	9,297	118	9,790
323	Motor vehicles and parts	159	16,821	206	24,732
3241,3242	Ships and boats	80	84,725	113	126,218
3243	Railway rolling stock and locomotives	18	5,317	22	5,312
3244	Aircraft	9	4,400	12	8,499
3245	Transport equipment n.e.c.	8	n.p.	12	n.p.
324	Total other transport equipment	3	n.p.	11	n.p.
32	Total transport equipment	38	16,180	56	18,028
3341,3342	Photographic and optical goods and photographic film processing	117	100,905	162	144,245
3343	(Medical and surgical equipment (excl. veterinary equipment)	13	6,836	28	8,700
	(Other measuring, professional and scientific equipment	50	12,772	59	20,899
334	Photographic, professional and scientific equipment	73	8,178	84	13,714
3351	Radio and TV receivers and audio equipment	132	27,786	169	43,312
	(Telecommunications and broadcasting equipment	19	1,551	36	2,866
3352	(Other electronic equipment	85	90,150	133	132,070
	(Computer hardware	189	18,897	218	30,325
	(Computer software	131	20,922	231	43,073
3353	Refrigerators and household appliances	254	66,772	549	155,589
3354	Water heating systems	58	12,227	69	13,880
3355-	Cables, batteries and other electrical machinery and equipment n.e.c.	25	3,691	22	4,059
3357	Total appliances and electrical equipment	114	13,983	244	30,930
3361	Agricultural machinery	717	228,191	1,244	412,793
3362	Construction machinery	76	8,793	77	9,830
3363	Materials handling equipment	24	2,395	9	n.p.
		60	5,046	62	5,278

See footnotes at end of table.

TABLE 16. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES(a), AUSTRALIA
R & D EXPENDITURE BY INDUSTRY OF PRODUCT FIELD (b)-Continued

Industry of product field		1984-85 ^r		1986-87	
ASIC Code	Description	Enterprises(c) (number)	R & D expenditure (\$'000)	Enterprises(c) (number)	R & D expenditure (\$'000)
3364	Wood and metal working machinery	32	3,442	47	5,039
3365	Pumps and compressors	33	4,111	32	3,266
3366	Commercial space heating and cooling equipment	11	2,278	26	4,836
3367	Dies, saw blades and machine tool accessories	9	565	5	n.p.
3368	Food processing equipment	41	6,526	48	9,610
3369	Industrial machinery & equipment n.e.c.	239	24,761	319	44,663
336	Total industrial machinery and equipment	463	57,916	565	85,260
33	Total other machinery and equipment	1184	313,893	1,823	541,365
345	Leather and leather products	5	160	6	269
346	Rubber products	13	2,079	25	1,902
347	Plastic and related products	87	8,238	104	16,213
348	Other manufacturing	39	4,522	49	5,276
34	Total miscellaneous manufacturing	140	14,999	174	23,659
C	TOTAL MANUFACTURING	1,852	647,670	2,778	1,074,094
<i>Other industries -</i>					
16	Services to mining	10	592	23	5,687
E	Construction	26	2,127	39	4,469
D,F-L	Other n.e.c.	125	29,884	129	32,471
16,D-L	TOTAL OTHER INDUSTRIES	159	32,603	187	42,626
TOTAL ALL INDUSTRIES		1,985	722,989	2,932	1,189,347
Private sector contribution		1,938	645,659	2,873	1,068,632
Public sector contribution		47	77,331	59	120,715

(a) Excludes enterprises in ASIC Division 'A'. (b) The industry of product (or process) field towards which the R & D activity was directed. For further explanation see paragraph 34 of the Explanatory Notes. (c) Where the R & D performed by an enterprise was directed towards more than one product, that enterprise is counted in each of the industries to which its products are coded. Therefore, the enterprise counts shown in this table cannot be summed to aggregates for combinations of industries.

TABLE 17. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES(a), AUSTRALIA, 1986-87
R & D EXPENDITURE BY INDUSTRY OF PRODUCT FIELD(b) BY ENTERPRISE EMPLOYMENT SIZE(c)

Industry of product field		Employment Size (persons)							
		Less than 200		200 to 499		500 or more			
		Enterprises(d)	R & D expenditure (\$'000)	Enterprises(d)	R & D expenditure (\$'000)	Enterprises(d)	R & D expenditure (\$'000)	Enterprises(d)	R & D expenditure (\$'000)
ASIC Code	Description	(number)		(number)		(number)		(number)	
<i>Manufacturing -</i>									
21	Food, beverages and tobacco	127	50,714	65	9,994	18	3,469	44	37,252
23-24	Textiles, clothing and footwear	47	6,457	31	3,785	6	852	10	1,819
25	Wood, wood products and furniture	64	5,982	45	2,433	10	1,081	9	2,468
26	Paper, paper products, printing and publishing	26	7,735	10	872	6	518	10	6,345
2763	Pharmaceuticals and veterinary products	101	61,354	71	32,200	19	11,629	11	17,525
(e)	Chemicals, petroleum and coal products	366	101,572	280	32,743	48	19,902	38	48,927
28	Non-metallic mineral products	82	21,590	51	9,773	10	2,971	21	8,846
29	Basic metal products	120	84,689	78	11,036	11	2,446	31	71,208
31	Fabricated metal products	206	24,732	145	9,975	29	3,627	32	11,130
32	Transport equipment	162	144,245	106	25,983	14	4,286	42	113,976
334	Photographic, professional and scientific equipment	169	43,312	154	25,827	4	n.p.	11	n.p.
335	Appliances and electrical equipment	1,244	412,793	1,079	188,121	61	23,955	104	200,736
336	Industrial machinery and equipment	565	85,260	462	53,844	48	10,907	55	20,510
34	Miscellaneous manufacturing	174	23,659	134	9,718	20	n.p.	20	n.p.
C	TOTAL MANUFACTURING	2,778	1,074,094	2,297	416,303	212	99,449	269	558,342
A,16,D-L	AGRICULTURE AND OTHER INDUSTRIES	275	115,253	186	24,385	24	20,975	65	69,893
	TOTAL ALL INDUSTRIES	2,932	1,189,347	2,416	440,688	224	120,424	292	628,235

(a) Excludes enterprises in ASIC Division 'A'. (b) The industry of product (or process) field towards which the R & D activity was directed. For further explanation see paragraph 34 of the Explanatory Notes. (c) Employment size is based on the number of persons employed by the enterprise. (d) Where the R & D performed by an enterprise was directed towards more than one product, that enterprise is counted in each of the industries to which its products are coded. Therefore, the enterprise counts shown in this table cannot be summed to aggregates for combinations of industries. (e) ASIC Subdivision 27 excluding ASIC Class 2763.

TABLE 18. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES(a), AUSTRALIA, 1986-87
R & D EXPENDITURE BY INDUSTRY OF PRODUCT FIELD (b) BY LOCATION(c)
(\$'000)

Industry of product field		Location							
ASIC Code	Description	Total	N.S.W.	Vic.	Qld.	W.A.	S.A.	Other Australian states and territories	Overseas
<i>Manufacturing -</i>									
21	Food, beverages and tobacco	50,714	18,166	25,180	4,956	n.p.	1,321	543	n.p.
23-24	Textiles, clothing and footwear	6,457	3,766	2,413	n.p.	n.p.	n.p.	n.p.	-
25	Wood, wood products and furniture	5,982	2,990	1,477	971	n.p.	224	n.p.	-
26	Paper, paper products, printing and publishing	7,735	321	3,311	n.p.	n.p.	n.p.	n.p.	-
2763	Pharmaceuticals and veterinary products	61,354	32,222	20,300	3,657	1,019	n.p.	514	n.p.
(d)	Chemicals, petroleum and coal products	101,572	29,269	47,509	13,534	5,470	2,626	2,069	1,095
28	Non-metallic mineral products	21,590	12,566	6,072	547	583	1,680	n.p.	n.p.
29	Basic metal products	84,689	28,164	23,082	12,928	7,883	3,634	n.p.	n.p.
31	Fabricated metal products	24,732	9,632	10,161	2,633	393	1,392	291	230
32	Transport equipment	144,245	21,896	96,836	3,195	13,297	8,255	n.p.	n.p.
334	Photographic, professional and scientific equipment	43,312	21,223	14,378	1,206	1,853	2,822	n.p.	n.p.
335	Appliances and electrical equipment	412,793	166,837	162,872	28,579	17,898	20,993	14,570	1,046
336	Industrial machinery and equipment	85,260	27,241	25,430	10,442	13,132	7,584	1,338	95
34	Miscellaneous manufacturing	23,659	5,591	11,601	1,362	309	4,651	n.p.	n.p.
C	TOTAL MANUFACTURING	1,074,094	379,885	450,620	84,870	62,578	59,332	26,541	10,267
A,16,D-L	AGRICULTURE AND OTHER INDUSTRIES	115,253	42,147	24,164	25,317	9,636	3,625	10,023	340
	TOTAL ALL INDUSTRIES	1,189,347	422,032	474,784	110,187	72,214	62,957	36,564	10,608
<i>Private sector contribution to 'Total all industries' -</i>									
1986-87		1,068,632	397,031	395,676	98,929	69,499	60,597	36,304	10,597
1984-85		645,659	252,352	254,719	47,343	29,548	41,321	18,336	2,038

(a) Excludes enterprises in ASIC Division 'A'. (b) The industry of product (or process) field towards which the R & D activity was directed. For further explanation see paragraph 34 of the Explanatory Notes. (c) Location of the R & D Expenditure. (d) ASIC Subdivision 27 excluding ASIC Class 2763.

TABLE 19. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES (a), AUSTRALIA, 1966-87
R & D EXPENDITURE BY INDUSTRY OF ENTERPRISE BY INDUSTRY OF PRODUCT FIELD (b)
(\$'000)

Industry of enterprise		Industry of Product Field																
ASIC Code	Description	Total all services to industries mining (c)	Mining (excluding tobacco) (11-15)	Food, beverages and tobacco (21)	Textiles, clothing and footwear (23-24)	Wood, wood products and furniture (25)	Paper, paper products, printing and publishing (26)	Chemicals, petroleum and coal products (27)	Non-metallic mineral products (28)	Basic metal products (29)	Fabricated metal products (31)	Transport equipment (32)	Photographic, professional and scientific equipment (334)	Appliances and electrical equipment (335)	Industrial machinery and miscellaneous manufacturing (336)	Miscellaneous manufacturing (34)	Total Manufacturing (C)	Agriculture and other industries (A,16 D-L)
Manufacturing -																		
21	Food, beverages and tobacco	54,980	-	42,596	n.p.	-	-	2,321	n.p.	n.p.	423	n.p.	n.p.	739	4,281	n.p.	51,706	3,274
23-24	Textiles, clothing and footwear	12,943	n.p.	-	5,115	n.p.	n.p.	-	-	n.p.	-	n.p.	-	n.p.	249	368	12,925	n.p.
25	Wood, wood products and furniture	6,299	-	n.p.	n.p.	3,631	n.p.	902	n.p.	-	n.p.	-	n.p.	n.p.	n.p.	n.p.	5,774	525
26	Paper, paper products, printing and publishing	9,367	-	n.p.	n.p.	-	6,326	176	-	-	-	-	n.p.	1,192	260	n.p.	8,189	1,178
27	Chemical, petroleum and coal products	118,952	n.p.	818	n.p.	n.p.	n.p.	110,222	n.p.	n.p.	588	-	2,010	441	1,332	2,137	117,955	n.p.
28	Non-metallic mineral products	14,870	n.p.	-	n.p.	n.p.	-	68	11,037	-	n.p.	-	-	-	n.p.	n.p.	14,866	n.p.
29	Basic metal products	64,535	n.p.	-	-	-	-	n.p.	n.p.	40,997	2,155	n.p.	-	2,003	3,285	n.p.	51,683	n.p.
31	Fabricated metal products	21,502	n.p.	-	n.p.	142	-	162	253	2,060	8,175	461	n.p.	6,830	2,676	411	21,458	n.p.
32	Transport equipment	126,901	n.p.	-	315	n.p.	-	101	-	n.p.	338	119,725	n.p.	1,344	1,633	185	126,871	n.p.
334	Photographic, professional and scientific equipment	25,308	n.p.	-	-	-	-	n.p.	-	n.p.	n.p.	n.p.	20,878	2,402	822	n.p.	25,295	n.p.
335	Appliances and electrical equipment	172,429	-	n.p.	-	n.p.	-	328	-	n.p.	886	343	3,045	159,395	8,032	128	172,339	89
336	Industrial machinery and equipment	41,906	n.p.	-	-	-	-	n.p.	n.p.	1,387	490	3,002	236	4,159	29,698	275	41,597	n.p.
34	Miscellaneous manufacturing	15,869	n.p.	-	n.p.	n.p.	-	1,298	n.p.	-	n.p.	546	n.p.	4,599	743	5,900	15,259	n.p.
C	TOTAL MANUFACTURING	685,859	n.p.	43,945	6,344	4,445	6,654	123,003	16,235	47,958	13,864	124,173	26,451	185,541	54,814	12,487	665,916	n.p.
Other industries -																		
F	Wholesale and retail trade	68,435	n.p.	1,419	n.p.	n.p.	n.p.	11,139	369	n.p.	n.p.	n.p.	6,017	34,751	6,781	573	66,316	n.p.
63	Property and business services	170,740	13,005	259	51	1,002	n.p.	9,141	3,288	21,156	6,638	15,263	1,922	73,536	11,220	n.p.	152,237	5,499
8461	Research and scientific institutions	44,763	n.p.	4,784	-	n.p.	-	13,492	n.p.	n.p.	n.p.	n.p.	5,714	2,778	2,967	n.p.	32,116	n.p.
(d)	Other n.e.c.	219,550	29,840	307	n.p.	321	n.p.	6,151	n.p.	14,327	2,217	1,543	3,208	116,186	9,477	1,704	157,509	32,201
11-16, D-L	TOTAL OTHER INDUSTRIES	503,489	n.p.	6,769	113	1,537	1,081	39,923	5,355	36,732	10,868	20,072	16,861	227,252	30,446	11,172	408,178	n.p.
	TOTAL ALL INDUSTRIES	1,189,347	61,124	50,714	6,457	5,982	7,735	162,927	21,590	84,689	24,732	144,245	43,312	412,793	85,260	23,659	1,074,094	54,130

(a) Excludes enterprises in ASIC Division 'A'. (b) The industry of product (or process) field towards which the R & D activity was directed. (c) ASIC Divisions A-L. (d) ASIC codes 11-16, D, E, G, H, 61-62, J, 8141-8306, 8462-8495, L.

TABLE 20. EXTRAMURAL R & D EXPENDITURE(a) BY BUSINESS ENTERPRISES(b), AUSTRALIA
DETAILS OF EXTRAMURAL PAYMENTS BY INDUSTRY OF ENTERPRISE

Industry of enterprise making payment		1984-85 ^c		1986-87	
ASIC Code	Description	Enterprises (number)	Payments (\$'000)	Enterprises (number)	Payments (\$'000)
11-15	MINING (excluding services to mining)	23	7,818	32	8,432
	<i>Manufacturing -</i>				
21	Food, beverages and tobacco	28	2,658	42	5,475
23-24	Textiles, clothing and footwear	7	520	6	n.p.
25	Wood, wood products and furniture	5	349	13	450
26	Paper, paper products, printing and publishing	9	499	11	774
27	Chemical, petroleum and coal products	37	11,081	62	24,055
28	Non-metallic mineral products	9	119	11	281
29	Basic metal products	13	2,643	16	5,134
31	Fabricated metal products	11	666	21	1,065
32	Transport equipment	8	n.p.	11	1,531
334	Photographic, professional and scientific equipment	4	n.p.	13	800
335	Appliances and electrical equipment	35	1,026	63	7,083
336	Industrial machinery and equipment	22	1,165	26	1,430
34	Miscellaneous manufacturing	7	294	21	n.p.
C	TOTAL MANUFACTURING	195	21,989	316	50,529
	<i>Other industries -</i>				
F	Wholesale and retail trade	34	24,099	63	53,960
63	Property and business services	38	4,279	75	34,867
8461	Research and scientific institutions	11	1,448	22	9,481
(c)	Other n.e.c.	45	28,900	78	22,871
16, D-L	TOTAL OTHER INDUSTRIES	128	58,727	238	121,180
	TOTAL ALL INDUSTRIES	346	88,534	586	180,140
	Private sector contribution	310	60,060	544	118,543
	Public sector contribution	36	28,474	42	61,597

(a) Expenditure on R & D which is funded by an enterprise but carried out by other enterprises. (b) Excludes enterprises in ASIC Division 'A'.
(c) ASIC codes 16,D,E,G,H,I,61-62,J,8141-8306,8462-8495,L.

TABLE 21. EXTRAMURAL R & D EXPENDITURE(a) BY BUSINESS ENTERPRISES(b), AUSTRALIA, 1986-87
PAYMENTS BY INDUSTRY OF ENTERPRISE MAKING PAYMENT BY LOCATION OF RECIPIENT

Industry of enterprise		Location of recipient					
		Total		Australia		Overseas	
		Enterprises(c) (number)	Payments (\$'000)	Enterprises (number)	Payments (\$'000)	Enterprises (number)	Payments (\$'000)
ASIC Code	Description						
11-15	MINING (excluding services to mining)	32	8,432	29	5,509	7	2,923
	<i>Manufacturing -</i>						
21	Food, beverages and tobacco	42	5,475	41	n.p.	3	n.p.
23-24	Textiles, clothing and footwear	6	n.p.	6	n.p.	2	n.p.
25	Wood, wood products and furniture	13	450	13	450	-	-
26	Paper, paper products, printing and publishing	11	774	11	719	4	55
27	Chemical, petroleum and coal products	62	24,055	55	7,107	16	16,948
28	Non-metallic mineral products	11	281	10	n.p.	1	n.p.
29	Basic metal products	16	5,134	14	3,646	5	1,488
31	Fabricated metal products	21	1,065	19	n.p.	2	n.p.
32	Transport equipment	11	1,531	7	n.p.	5	n.p.
334	Photographic, professional and scientific equipment	13	800	13	800	-	-
335	Appliances and electrical equipment	63	7,083	54	3,529	12	3,553
336	Industrial machinery and equipment	26	1,430	24	n.p.	3	n.p.
34	Miscellaneous manufacturing	21	n.p.	19	n.p.	4	n.p.
C	TOTAL MANUFACTURING	316	50,529	286	26,245	57	24,284
	<i>Other industries -</i>						
F	Wholesale and retail trade	63	53,960	61	n.p.	7	n.p.
63	Property and business services	75	34,867	66	21,485	15	13,382
8461	Research and scientific institutions	22	9,481	22	n.p.	2	n.p.
(d)	Other n.e.c.	78	22,871	76	19,203	13	3,668
16, D-L	TOTAL OTHER INDUSTRIES	238	121,180	225	93,396	37	27,784
	TOTAL ALL INDUSTRIES	586	180,140	540	125,150	101	54,991
	<i>Private sector contribution to 'Total all industries' -</i>						
	1986-87	544	118,543	499	64,864	94	53,679
	1984-85	310	60,060	274	23,909	65	36,152

(a) Expenditure on R & D which is funded by an enterprise but carried out by other enterprises. (b) Excludes enterprises in ASIC Division 'A'. (c) Where the extramural R & D expenditure of an enterprise funded R & D both within Australia and overseas, that enterprise is counted in each of these recipient locations. Therefore, the enterprise aggregates obtained by summation of these location categories may be greater than the total enterprise count provided at each industry level. (d) ASIC codes 16,D,E,G,H,61-62,J,8141-8306,8462-8495,L.

TABLE 22. EXTRAMURAL R & D EXPENDITURE(a) BY BUSINESS ENTERPRISES(b), AUSTRALIA, 1986-87
PAYMENTS BY COUNTRY OF RECIPIENT BY RELATIONSHIP OF RECIPIENT TO ENTERPRISE MAKING PAYMENT
(\$'000)

Country of recipient	Relationship of recipient to enterprise making payment	Industry of enterprise making payment					
		1984-85			1986-87		
		Total all industries	Manufacturing	Mining and other industries	Total all industries	Manufacturing	Mining and other industries
U.K. -							
	Related enterprises	n.p.	1,617	n.p.	n.p.	3,430	n.p.
	Unrelated enterprises	n.p.	n.p.	n.p.	n.p.	77	n.p.
	Total	3,083	n.p.	n.p.	13,054	3,507	9,547
U.S.A. -							
	Related enterprises	n.p.	n.p.	n.p.	19,366	4,443	14,923
	Unrelated enterprises	n.p.	n.p.	1,589	3,425	569	2,856
	Total	25,068	n.p.	n.p.	22,791	5,012	17,779
Other overseas -							
	Related enterprises	7,336	n.p.	n.p.	n.p.	14,532	n.p.
	Unrelated enterprises	1,559	n.p.	n.p.	n.p.	1,232	n.p.
	Total	8,895	7,464	1,431	19,146	15,765	3,382
Total overseas -							
	Related enterprises	32,993	n.p.	n.p.	42,303	22,405	19,897
	Unrelated enterprises	4,053	n.p.	n.p.	12,688	1,878	10,810
	Total	37,046	10,468	26,578	54,991	24,284	30,707
Australia							
		51,489	11,522	39,967	125,150	26,245	98,905
TOTAL		88,534	21,989	66,545	180,140	50,529	129,612
Private sector contribution		60,060	21,738	38,322	118,543	50,343	68,201
Public sector contribution		28,474	251	28,223	61,597	186	61,411

(a) Expenditure on R & D which is funded by an enterprise but carried out by other enterprises. (b) Excludes enterprises in ASIC Division 'A'.

TABLE 23. EXTRAMURAL R & D EXPENDITURE(a) BY BUSINESS ENTERPRISES(b), AUSTRALIA, 1986-87
PAYMENTS BY COUNTRY OF RECIPIENT
(\$'000)

Industry of enterprise making payment	Total Payments	Australia	Canada	Federal Republic of Germany	France	Japan	Netherlands	New Zealand	Sweden	Switzerland	U.K.	U.S.A	Other
C Manufacturing	50,529	26,245	n.p.	n.p.	n.p.	205	n.p.	n.p.	-	n.p.	3,507	5,012	7,795
B,D-L Mining and other industries	129,612	98,905	n.p.	n.p.	-	-	n.p.	n.p.	-	n.p.	9,547	17,779	2,082
TOTAL ALL INDUSTRIES	180,140	125,150	1,587	810	n.p.	205	n.p.	n.p.	-	n.p.	13,054	22,791	9,877
<i>Private sector contribution to 'Total all industries' -</i>													
1986-87	118,543	64,864	1,587	n.p.	n.p.	205	n.p.	n.p.	-	n.p.	12,912	22,556	9,450
1984-85	60,060	23,909	n.p.	408	n.p.	n.p.	n.p.	96	n.p.	n.p.	3,046	24,778	594

(a) Excludes enterprises in ASIC Division 'A'. (b) Expenditure on R & D which is funded by an enterprise but carried out by other enterprises

TABLE 24. EXTRAMURAL R & D EXPENDITURE(a) BY BUSINESS ENTERPRISES(b), AUSTRALIA, 1986-87
PAYMENTS BY ENTERPRISE EMPLOYMENT SIZE(c)
(\$'000)

Industry of enterprise making payment	Total Payments	Enterprise employment size (persons)							
		Less than 10	10 to 19	20 to 49	50 to 99	100 to 199	200 to 499	500 to 999	1,000 or more
C Manufacturing	50,529	8,275	1,309	4,499	2,490	3,335	n.p.	n.p.	14,650
B,D-L Mining and other industries	129,612	16,736	16,641	11,184	1,707	3,457	n.p.	n.p.	39,208
TOTAL ALL INDUSTRIES	180,140	25,011	17,949	15,682	4,197	6,792	44,255	12,397	53,858
<i>Private sector contribution to 'Total all industries' -</i>									
1986-87	118,543	24,680	n.p.	15,628	4,044	4,798	n.p.	n.p.	40,367
1984-85	60,060	n.p.	n.p.	1,658	n.p.	2,341	5,644	n.p.	19,916

(a) Excludes enterprises in ASIC Division 'A'. (b) Expenditure on R & D which is funded by an enterprise but carried out by other enterprises (c) Employment size is based on the number of persons employed by the enterprise.

TABLE 25. PAYMENTS AND RECEIPTS FOR TECHNICAL KNOW-HOW BY BUSINESS ENTERPRISES(a), AUSTRALIA
PAYMENTS AND RECEIPTS BY INDUSTRY OF ENTERPRISE(b)
(\$'m)

Industry of enterprise		Payments for technical know-how			Receipts for technical know-how		
ASIC Code	Description	1981-82	1984-85r	1986-87	1981-82	1984-85r	1986-87
<i>Manufacturing -</i>							
21	Food, beverages and tobacco	14.9	16.8	23.9	-	1.1	3.5
23-24	Textiles, clothing and footwear	1.4	8.9	n.p.	-	n.p.	n.p.
25	Wood, wood products and furniture	)	0.1	0.2	-	n.p.	0.6
26	Paper, paper products, printing and publishing	) 2.9	4.1	4.0	-	n.p.	n.p.
27	Chemical, petroleum and coal products	34.3	39.1	53.3	3.6	6.6	6.2
28	Non-metallic mineral products	5.6	7.8	1.4	-	n.p.	n.p.
29	Basic metal products	7.6	4.7	9.8	2.0	6.1	n.p.
31	Fabricated metal products	3.3	2.3	3.9	0.7	1.1	1.2
32	Transport equipment	13.8	17.4	35.5	2.0	n.p.	1.0
334	Photographic, professional and scientific equipment	)	n.p.	n.p.	)	n.p.	n.p.
335	Appliances and electrical equipment	) 16.9	28.3	48.5	) 1.3	n.p.	3.8
336	Industrial machinery and equipment	3.2	n.p.	8.3	0.2	1.4	n.p.
34	Miscellaneous manufacturing	3.3	4.9	10.9	0.9	n.p.	n.p.
C	TOTAL MANUFACTURING	107.2	146.6	236.2	11.5	23.8	44.9
<i>Other industries -</i>							
F	Wholesale and retail trade	)	4.3	11.5	)	0.5	6.2
63	Property and business services	) 28.9	8.0	7.7	) 5.9	6.2	43.5
8461	Research and scientific institutions	)	n.p.	n.p.	)	n.p.	3.0
(c)	Other n.e.c.	)	n.p.	n.p.	)	n.p.	8.7
11-16, D-L	TOTAL OTHER INDUSTRIES	28.9	19.9	41.2	5.9	12.3	61.5
	TOTAL ALL INDUSTRIES	136.0	166.5	277.4	17.4	36.1	106.4

(a) Excludes enterprises in ASIC Division 'A'. (b) 1984-85 and 1986-87 data are classified by the 1983 edition of ASIC; 1981-82 data are classified by the 1978 edition of ASIC. If the 1983 version were used to classify 1981-82 data, only minor differences would occur. (c) ASIC Codes 11-16, D, E, G, H, 61-62, J, 8141-8306, 8462-8495, L.

TABLE 26. PAYMENTS BY BUSINESS ENTERPRISES(a) FOR TECHNICAL KNOW-HOW, AUSTRALIA, 1986-87
DETAILS OF PAYMENTS BY INDUSTRY OF ENTERPRISE

Industry of enterprise		Type of technical know-how					
ASIC Code	Description	Enterprises (number)	Total (\$'000)	Patent licence fees and royalties (\$'000)	Other technical know-how (\$'000)	Payments within Australia (\$'000)	Payments made overseas (\$'000)
Manufacturing -							
21	Food, beverages and tobacco	17	23,929	3,138	20,791	584	23,345
23-24	Textiles, clothing and footwear	11	n.p.	n.p.	n.p.	n.p.	n.p.
25	Wood, wood products and furniture	7	230	171	59	n.p.	n.p.
26	Paper, paper products, printing and publishing	8	4,021	n.p.	n.p.	n.p.	n.p.
27	Chemical, petroleum and coal products	71	53,287	34,106	19,180	1,035	52,252
28	Non-metallic mineral products	11	1,420	211	1,209	n.p.	n.p.
29	Basic metal products	11	9,766	5,497	4,269	n.p.	n.p.
31	Fabricated metal products	26	3,922	3,094	827	215	3,706
32	Transport equipment	25	35,535	7,087	28,448	n.p.	n.p.
334	Photographic, professional and scientific equipment	14	n.p.	n.p.	n.p.	n.p.	n.p.
335	Appliances and electrical equipment	70	48,536	16,247	32,289	13,657	34,878
336	Industrial machinery and equipment	40	8,299	7,671	628	n.p.	n.p.
34	Miscellaneous manufacturing	19	10,942	n.p.	n.p.	334	10,607
C	TOTAL MANUFACTURING	330	236,156	103,723	132,433	21,869	214,287
Other industries -							
F	Wholesale and retail trade	43	11,458	6,678	4,780	1,837	9,621
63	Property and business services	48	7,708	5,577	2,131	701	7,007
8461	Research and scientific institutions	7	n.p.	n.p.	n.p.	n.p.	n.p.
(b)	Other n.e.c.	28	n.p.	n.p.	n.p.	n.p.	n.p.
11-16, D-L	TOTAL OTHER INDUSTRIES	126	41,240	22,873	18,367	11,687	29,553
TOTAL ALL INDUSTRIES		456	277,396	126,596	150,800	33,556	243,840
Private sector contribution to 'Total all industries' -							
1986-87		451	n.p.	n.p.	n.p.	n.p.	n.p.
1984-85		361	163,660	n.p.	n.p.	4,363	159,297

(a) Excludes enterprises in ASIC Division 'A'. (b) ASIC Codes 11-16, D, E, G, H, J, L, M, N, P, Q, R, S, T, U, V, W, X, Y, Z.

(a) Excludes enterprises in ASIC Division 'A'. (b) ASIC Codes 11-16, D, E, G, H, 61-62, J, 8141-8306, 8462-8495, L.

TABLE 27. PAYMENTS BY BUSINESS ENTERPRISES(a) FOR TECHNICAL KNOW-HOW, AUSTRALIA, 1986-87
PAYMENTS MADE OVERSEAS BY INDUSTRY OF ENTERPRISE
(\$'000)

Industry of enterprise		Relationship of recipient enterprise to paying enterprise			Country of recipient enterprise		
ASIC Code	Description	Payments made overseas	Related	Unrelated	U.K.	U.S.A.	Other
<i>Manufacturing -</i>							
21	Food, beverages and tobacco	23,345	22,420	925	n.p.	6,448	n.p.
23-24	Textiles, clothing and footwear	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
25	Wood, wood products and furniture	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
26	Paper, paper products, printing and publishing	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
27	Chemical, petroleum and coal products	52,252	42,977	9,275	7,971	36,772	7,509
28	Non-metallic mineral products	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
29	Basic metal products	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
31	Fabricated metal products	3,706	n.p.	n.p.	n.p.	2,942	n.p.
32	Transport equipment	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
334	Photographic, professional and scientific equipment	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
335	Appliances and electrical equipment	34,878	22,767	12,112	3,577	10,762	20,539
336	Industrial machinery and equipment	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
34	Miscellaneous manufacturing	10,607	n.p.	n.p.	1,117	n.p.	n.p.
C	TOTAL MANUFACTURING	214,287	168,803	45,484	18,574	108,104	87,610
<i>Other industries -</i>							
F	Wholesale and retail trade	9,621	4,154	5,468	1,138	4,153	4,330
63	Property and business services	7,007	1,366	5,641	312	5,446	1,249
8461	Research and scientific institutions	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
(b)	Other n.e.c.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
11-16, D-L	TOTAL OTHER INDUSTRIES	29,553	7,160	22,393	1,463	18,662	9,428
	TOTAL ALL INDUSTRIES	243,840	175,963	67,877	20,037	126,766	97,037
<i>Private sector contribution to 'Total all industries' -</i>							
1986-87		n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
1984-85		159,297	116,634	42,663	n.p.	94,337	n.p.

(a) Excludes enterprises in ASIC Division 'A'. (b) ASIC Codes 11-16,D,E,G,H,61-62,J,8141-8306,8462-8495,L.

TABLE 28. PAYMENTS BY BUSINESS ENTERPRISES(a) FOR TECHNICAL KNOW-HOW, AUSTRALIA, 1986-87
PAYMENTS BY COUNTRY OF RECIPIENT
(\$'000)

Industry of enterprise														
ASIC Code	Description	Total	Australia	Canada	Federal Republic of Germany	France	Japan	Netherlands	New Zealand	Sweden	Switzerland	U.K.	USA	Other
C	Manufacturing	236,156	21,869	n.p.	7,767	n.p.	32,707	n.p.	n.p.	n.p.	n.p.	18,574	108,104	7,703
B,D-L	Mining and other industries	41,240	11,687	n.p.	1,720	n.p.	1,239	n.p.	n.p.	n.p.	n.p.	1,463	18,662	1,960
TOTAL ALL INDUSTRIES		277,396	33,556	5,531	9,487	5,652	33,946	180	294	12,026	20,259	20,037	126,766	9,663
Private sector contribution to 'Total all industries'														
	1986-87	n.p.	33,390	5,531	9,487	5,652	33,946	180	294	12,026	20,259	20,037	n.p.	9,663
	1984-85	163,660	4,363	950	5,598	6,818	14,115	n.p.	297	5,284	11,987	n.p.	94,337	2,205
(a) Excludes enterprises in ASIC Division 'A'.														

(a) Excludes enterprises in ASIC Division 'A'.

TABLE 29. PAYMENTS BY BUSINESS ENTERPRISES (a) FOR TECHNICAL KNOW-HOW, AUSTRALIA, 1986-87
PAYMENTS BY INDUSTRY OF ENTERPRISE BY ENTERPRISE EMPLOYMENT SIZE (b)

Industry of enterprise		Enterprise employment size (persons)							
		Less than 200		200 to 499		500 or more			
ASIC Code	Description	Enterprises (number)	Payments (\$'000)	Enterprises (number)	Payments (\$'000)	Enterprises (number)	Payments (\$'000)	Enterprises (number)	Payments (\$'000)
Manufacturing -									
21	Food, beverages and tobacco	17	23,929	3	n.p.	3	n.p.	11	20,760
23-24	Textiles, clothing and footwear	11	n.p.	5	n.p.	3	n.p.	3	n.p.
25	Wood, wood products and furniture	7	230	4	89	1	n.p.	2	n.p.
26	Paper, paper products, printing and publishing	8	4,021	3	n.p.	2	n.p.	3	n.p.
27	Chemical, petroleum and coal products	71	53,287	44	14,773	15	12,428	12	26,086
28	Non-metallic mineral products	11	1,420	6	n.p.	1	n.p.	4	932
29	Basic metal products	11	9,766	3	648	1	n.p.	7	n.p.
31	Fabricated metal products	26	3,922	14	n.p.	5	n.p.	7	2,468
32	Transport equipment	25	35,535	9	n.p.	1	n.p.	15	33,595
334	Photographic, professional and scientific equipment	14	n.p.	12	n.p.	1	n.p.	1	n.p.
335	Appliances and electrical equipment	70	48,536	49	16,238	8	2,382	13	29,916
336	Industrial machinery and equipment	40	8,299	35	6,445	3	n.p.	2	n.p.
34	Miscellaneous manufacturing	19	10,942	11	4,211	3	n.p.	5	n.p.
C	TOTAL MANUFACTURING	330	236,156	198	67,620	47	23,726	85	144,809
Other industries -									
F	Wholesale and retail trade	43	11,458	34	4,591	4	n.p.	5	n.p.
63	Property and business services	48	7,708	38	2,033	5	n.p.	5	n.p.
8461	Research and scientific institutions	7	n.p.	7	n.p.	-	n.p.	-	n.p.
(c)	Other n.e.c.	28	n.p.	18	n.p.	-	n.p.	6	n.p.
11-16, D-L	TOTAL OTHER INDUSTRIES	126	41,240	97	16,225	13	3,091	16	21,924
TOTAL ALL INDUSTRIES		456	277,396	295	83,845	60	26,817	101	166,734

(a) Excludes enterprises in ASIC Division 'A'. (b) Employment size is based on the number of persons employed by the enterprise. (c) ASIC codes 11-16, D, E, G, H, 61-62, J, 8141-8306, 8462-8495, L.

TABLE 30. PAYMENTS BY BUSINESS ENTERPRISES(a) FOR TECHNICAL KNOW-HOW, AUSTRALIA, 1986-87
 PAYMENTS BY ENTERPRISE EMPLOYMENT SIZE(b)
 (\$'000)

Industry of enterprise		Enterprise employment size (persons)							
ASIC Code	Description	Total Payments	Less than 10	10 to 19	20 to 49	50 to 99	100 to 199	200 to 499	500 to 999 1,000 or more
C	Manufacturing	236,156	12,258	8,720	n.p.	n.p.	15,428	23,726	n.p.
B,D-L	Mining and other industries	41,240	9,523	1,093	n.p.	n.p.	338	3,091	n.p.
	TOTAL ALL INDUSTRIES	277,396	21,781	9,813	27,081	9,404	15,765	26,817	35,662
	<i>Private sector contribution to 'Total all industries' -</i>								
	1986-87	n.p.	21,781	9,813	27,051	n.p.	15,735	26,817	35,556
	1984-85	163,660	958	808	9,614	3,896	15,671	21,255	22,739

(a) Excludes enterprises in ASIC Division 'A'. (b) Employment size is based on the number of persons employed by the enterprise.

TABLE 31. RECEIPTS BY BUSINESS ENTERPRISES(a) FOR TECHNICAL KNOW-HOW, AUSTRALIA, 1986-87
DETAILS OF RECEIPTS BY INDUSTRY OF ENTERPRISE

Industry of enterprise		Type of technical know-how					
ASIC Code	Description	Enterprises (number)	Total (\$'000)	Patent licence fees and royalties (\$'000)	Other technical know-how (\$'000)	Receipts from within Australia (\$'000)	Receipts from overseas (\$'000)
<i>Manufacturing -</i>							
21	Food, beverages and tobacco	7	3,462	3,100	362	n.p.	n.p.
23-24	Textiles, clothing and footwear	2	n.p.	n.p.	n.p.	n.p.	n.p.
25	Wood, wood products and furniture	4	594	n.p.	n.p.	n.p.	n.p.
26	Paper, paper products, printing and publishing	1	n.p.	n.p.	n.p.	n.p.	594
27	Chemical, petroleum and coal products	19	6,171	4,366	1,805	1,078	n.p.
28	Non-metallic mineral products	3	n.p.	n.p.	n.p.	n.p.	5,093
29	Basic metal products	4	n.p.	n.p.	n.p.	n.p.	n.p.
31	Fabricated metal products	11	1,247	651	595	n.p.	n.p.
32	Transport equipment	5	998	998	-	n.p.	n.p.
334	Photographic, professional and scientific equipment	1	n.p.	n.p.	n.p.	n.p.	998
335	Appliances and electrical equipment	36	3,789	624	3,165	1,986	n.p.
336	Industrial machinery and equipment	18	n.p.	n.p.	n.p.	n.p.	1,804
34	Miscellaneous manufacturing	3	n.p.	n.p.	n.p.	n.p.	n.p.
C	TOTAL MANUFACTURING	114	44,901	35,060	9,841	12,847	32,054
<i>Other industries -</i>							
F	Wholesale and retail trade	16	6,243	n.p.	n.p.	4,599	1,644
63	Property and business services	75	43,536	17,486	26,050	20,452	23,083
8461	Research and scientific institutions	13	3,038	762	2,276	n.p.	n.p.
(b)	Other n.e.c.	14	8,697	n.p.	n.p.	n.p.	n.p.
11-16, D-L	TOTAL OTHER INDUSTRIES	118	61,514	25,500	36,014	30,552	30,962
TOTAL ALL INDUSTRIES		232	106,415	60,560	45,854	43,399	63,016
<i>Private sector contribution to 'Total all industries' -</i>							
1986-87		230	106,354	60,535	45,818	43,375	62,979
1984-85		152	n.p.	n.p.	n.p.	n.p.	n.p.

(a) Excludes enterprises in ASIC Division 'A'. (b) ASIC Codes 11-16,D,E,G,H,I,61-62,J,8141-8306,8462-8495,L.

TABLE 32. RECEIPTS BY BUSINESS ENTERPRISES(a) FOR TECHNICAL KNOW-HOW, AUSTRALIA, 1986-87
RECEIPTS FROM OVERSEAS BY INDUSTRY OF ENTERPRISE
(\$'000)

Industry of enterprise		Relationship of paying enterprise to recipient enterprise			Country of paying enterprise		
ASIC Code	Description	Receipts from overseas	Related	Unrelated	U.K.	U.S.A.	Other
Manufacturing -							
21	Food, beverages and tobacco	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
23-24	Textiles, clothing and footwear	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
25	Wood, wood products and furniture	594	n.p.	n.p.	-	-	594
26	Paper, paper products, printing and publishing	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
27	Chemical, petroleum and coal products	5,093	n.p.	n.p.	n.p.	n.p.	n.p.
28	Non-metallic mineral products	n.p.	n.p.	n.p.	n.p.	3,607	n.p.
29	Basic metal products	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
31	Fabricated metal products	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
32	Transport equipment	998	n.p.	n.p.	n.p.	n.p.	n.p.
334	Photographic, professional and scientific equipment	n.p.	n.p.	n.p.	n.p.	n.p.	479
335	Appliances and electrical equipment	1,804	n.p.	n.p.	n.p.	n.p.	n.p.
336	Industrial machinery and equipment	n.p.	939	865	n.p.	n.p.	601
34	Miscellaneous manufacturing	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
C	TOTAL MANUFACTURING	32,054	21,998	10,056	1,317	10,458	20,279
Other industries -							
F	Wholesale and retail trade	1,644	311	1,333	n.p.	n.p.	1,406
63	Property and business services*	23,083	6,822	16,262	825	13,193	9,065
8461	Research and scientific institutions	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
(b)	Other n.e.c.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
11-16, D-L	TOTAL OTHER INDUSTRIES	30,962	7,435	23,527	1,240	15,799	13,924
TOTAL ALL INDUSTRIES		63,016	29,433	33,583	2,557	26,257	34,203
Private sector contribution to 'Total all industries' -							
1986-87		62,979	29,433	33,546	2,557	26,257	34,166
1984-85		n.p.	n.p.	n.p.	n.p.	n.p.	n.p.

(a) Excludes enterprises in ASIC Division 'A'. (b) ASIC Codes 11-16, D, E, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z.

(a) Excludes enterprises in ASIC Division 'A'. (b) ASIC Codes 11-16, D, E, G, H, 61-62, J, 8141-8306, 8462-8495, L.

TABLE 33. RECEIPTS BY BUSINESS ENTERPRISES(a) FOR TECHNICAL KNOW-HOW, AUSTRALIA, 1986-87
RECEIPTS BY COUNTRY OF RECIPIENT
(\$'000)

(\$ 000)

Industry of enterprise		Federal Republic of												
ASIC Code	Description	Total	Australia	Canada	Germany	France	Japan	Netherlands	New Zealand	Sweden	Switzerland	U.K.	U.S.A	Other
C	Manufacturing	44,901	12,847	227	n.p.	n.p.	n.p.	n.p.	1,778	n.p.	n.p.	1,317	10,458	4,121
B,D-L	Mining and other industries	61,514	30,552	850	n.p.	n.p.	n.p.	n.p.	2,707	n.p.	n.p.	1,240	15,799	5,343
TOTAL ALL INDUSTRIES		106,415	43,399	1,077	2,703	n.p.	2,943	n.p.	4,486	n.p.	n.p.	2,557	26,257	9,464
Private sector contribution to 'Total all industries' -														
	1986-87	106,354	43,375	1,077	2,703	n.p.	2,943	n.p.	4,482	n.p.	n.p.	2,557	26,257	9,431
	1984-85	n.p.	8,127	547	636	96	900	903	2,436	-	n.p.	7,090	n.p.	6,171

(a) Excludes enterprises in ASIC Division 'A'.

TABLE 34. RECEIPTS BY BUSINESS ENTERPRISES(a) FOR TECHNICAL KNOW-HOW, AUSTRALIA, 1986-87
RECEIPTS BY INDUSTRY OF ENTERPRISE BY ENTERPRISE EMPLOYMENT SIZE(b)

Industry of enterprise		Enterprise employment size (persons)							
		Less than 200		200 to 499		500 or more			
ASIC Code	Description	Enterprises (number)	Receipts (\$'000)	Enterprises (number)	Receipts (\$'000)	Enterprises (number)	Receipts (\$'000)	Enterprises (number)	Receipts (\$'000)
Manufacturing -									
21	Food, beverages and tobacco	7	3,462	2	n.p.	-	-	5	n.p.
23-24	Textiles, clothing and footwear	2	n.p.	2	n.p.	-	-	-	-
25	Wood, wood products and furniture	4	594	2	n.p.	1	n.p.	1	n.p.
26	Paper, paper products, printing and publishing	1	n.p.	-	-	-	-	-	-
27	Chemical, petroleum and coal products	19	6,171	8	959	3	136	1	n.p.
28	Non-metallic mineral products	3	n.p.	1	n.p.	-	-	2	5,076
29	Basic metal products	4	n.p.	-	-	1	n.p.	3	n.p.
31	Fabricated metal products	11	1,247	6	647	1	n.p.	4	n.p.
32	Transport equipment	5	998	2	n.p.	-	-	3	n.p.
334	Photographic, professional and scientific equipment	1	n.p.	1	n.p.	-	-	-	-
335	Appliances and electrical equipment	36	3,789	32	3,633	2	n.p.	2	n.p.
336	Industrial machinery and equipment	18	n.p.	13	n.p.	5	n.p.	-	-
34	Miscellaneous manufacturing	3	n.p.	2	n.p.	1	n.p.	-	-
C	TOTAL MANUFACTURING	114	44,901	71	29,641	14	1,668	29	13,592
Other industries -									
F	Wholesale and retail trade	16	6,243	13	n.p.	1	n.p.	2	n.p.
63	Property and business services	75	43,536	67	38,360	2	n.p.	6	n.p.
8461	Research and scientific institutions	13	3,038	13	3,038	-	-	-	-
(c)	Other n.e.c.	14	8,697	8	n.p.	1	n.p.	5	n.p.
11-16, D-L	TOTAL OTHER INDUSTRIES	118	61,514	101	52,842	4	77	13	8,595
TOTAL ALL INDUSTRIES		232	106,415	172	82,483	18	1,745	42	22,187

(a) Excludes enterprises in ASIC Division 'A'. (b) Employment size is based on the number of persons employed by the enterprise. (c) ASIC codes 11-16, D, E, G, H, 61-62, J, 8141-8306, 8462-8495, L.

TABLE 35. RECEIPTS BY BUSINESS ENTERPRISES(a) FOR TECHNICAL KNOW-HOW, AUSTRALIA, 1986-87
RECEIPTS BY ENTERPRISE EMPLOYMENT SIZE(b)
(\$'000)

Industry of enterprise		Enterprise employment size (persons)							
ASIC Code	Description	Total Receipts	Less than 10	10 to 19	20 to 49	50 to 99	100 to 199	200 to 499	500 to 999 1,000 or more
C	Manufacturing	44,901	2,836	1,406	9,015	n.p.	n.p.	1,668	n.p.
B,D-L	Mining and other industries	61,514	3,228	9,399	21,651	n.p.	n.p.	77	n.p.
TOTAL ALL INDUSTRIES		106,415	6,065	10,804	30,666	n.p.	n.p.	1,745	5,393 16,794
Private sector contribution to 'Total all industries' -									
	1986-87	106,354	6,065	10,804	30,666	n.p.	n.p.	1,745	5,393 16,749
	1984-85	n.p.	2,624	4,351	7,598	n.p.	n.p.	4,752	785 10,603

(a) Excludes enterprises in ASIC Division 'A'. (b) Employment size is based on the number of persons employed by the enterprise.

TABLE 36. PATENT ACTIVITY BY BUSINESS ENTERPRISES(a) WITH RESEARCH AND EXPERIMENTAL DEVELOPMENT ACTIVITY DURING 1986-87
PATENT ACTIVITY JULY 1985 - JUNE 1987 BY INDUSTRY OF ENTERPRISE

Industry of enterprise		Number of enterprises with patent activity				Patent activity			
		Australia		Overseas		Australia		Overseas	
		Patent applications lodged	Patents granted	Patent applications lodged	Patents granted	Patent applications lodged	Patents granted	Patent applications lodged	Patents granted
ASIC Code	Description								
11-15	MINING (excluding services to mining)	6	3	4	3	21	5	32	27
	<i>Manufacturing -</i>								
21	Food, beverages and tobacco								
23-24	Textiles, clothing and footwear	13	5	10	3	16	7	65	n.p.
25	Wood, wood products and furniture	5	5	3	6	15	7	n.p.	12
26	Paper, paper products, printing and publishing	11	11	5	7	30	25	38	27
27	Chemical, petroleum and coal products	6	4	5	2	10	5	22	n.p.
28	Non-metallic mineral products	40	22	24	16	156	112	620	330
29	Basic metal products	9	7	5	6	17	11	n.p.	27
31	Fabricated metal products	15	6	10	4	83	28	167	113
32	Transport equipment	56	37	35	26	167	84	269	110
334	Photographic, professional and scientific equipment	29	15	17	5	68	26	60	9
335	Appliances and electrical equipment	17	10	13	11	48	36	142	45
336	Industrial machinery and equipment	97	42	55	31	318	107	695	171
34	Miscellaneous manufacturing	69	40	52	41	207	87	604	320
		25	15	17	14	77	45	153	87
C	TOTAL MANUFACTURING	392	219	251	172	1,212	580	2,898	1,302
	<i>Other industries -</i>								
F	Wholesale and retail trade								
63	Property and business services	51	33	32	19	97	62	181	86
8461	Research and scientific institutions	86	45	54	49	228	94	1,011	391
(b)	Other n.e.c.	27	13	20	14	90	26	503	99
		47	25	28	21	106	30	330	98
16, D-L	TOTAL OTHER INDUSTRIES	211	116	134	103	521	212	2,025	674
	TOTAL ALL INDUSTRIES	609	338	389	278	1,754	797	4,955	2,003
July 1982 - June 1985		451	286	303	241	1,600	775	4,342	2,345

(a) Excludes enterprises in ASIC Division 'A'. (b) ASIC Codes 16,D,E,G,H,61-62,J,8141-8306,8462-8495,L.

TABLE 37. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES(a), AUSTRALIA
DETAILS OF RESOURCES DEVOTED TO ENERGY R & D BY ENERGY OBJECTIVE CODE

Energy objective code		1984-85 ^r				1986-87			
Code	Description	Enterprises(b) (number)	Total Expenditure (\$'000)	Source of funds		Enterprises(b) (number)	Total Expenditure (\$'000)	Source of funds	
				Industry(c) (\$'000)	Government(d) (\$'000)			Industry(c) (\$'000)	Government(d) (\$'000)
<i>Production and utilization of energy</i>									
<i>Oil and gas</i>									
06003	Mining extraction techniques	8	n.p.	n.p.	n.p.	3	n.p.	n.p.	n.p.
10001	Refining, transport and storage	13	958	n.p.	n.p.	16	1,382	n.p.	n.p.
(e)	Other	18	2,876	n.p.	n.p.	24	1,584	n.p.	n.p.
(e)	Oil shale and tar sands	5	n.p.	n.p.	n.p.	6	n.p.	n.p.	n.p.
	Total oil and gas	37	9,990	9,583	407	44	6,571	6,010	561
<i>Coal</i>									
06002	Mining extraction techniques	20	10,323	6,558	3,765	30	17,201	12,762	4,440
10010	Preparation and transport	11	10,135	8,659	1,477	20	10,468	9,266	1,201
10011	Combustion	9	4,126	3,112	1,014	13	5,378	n.p.	n.p.
10050	Conversion	8	2,723	423	2,300	7	1,117	n.p.	n.p.
(e)	Other	22	8,893	8,083	811	23	5,689	4,485	1,204
	Total coal	50	36,200	26,834	9,366	67	39,853	31,749	8,105
<i>Solar energy</i>									
10015	Heating and cooling	21	3,026	2,721	305	18	2,391	2,351	40
10016	Photo-electric	16	1,581	1,054	527	13	n.p.	n.p.	n.p.
10017	Thermal-electric	4	187	187	-	6	n.p.	n.p.	n.p.
	Total solar	36	4,794	3,962	832	36	3,713	3,250	463
<i>Nuclear</i>									
<i>Non-breeder</i>									
10020	Light water reactor	-	-	-	-	-	-	-	-
10024	Other converter reactor	-	-	-	-	-	-	-	-
(e)	Fuel cycle	4	244	n.p.	n.p.	3	n.p.	n.p.	n.p.
10026	Supporting technologies	-	-	-	-	-	-	-	-
10030	Breeder	-	-	-	-	-	-	-	-
10035	Fusion	-	-	-	-	1	n.p.	n.p.	n.p.
	Total nuclear	4	244	n.p.	n.p.	4	78	8	-
<i>Other primary sources</i>									
10040	Wind	10	370	296	73	13	638	n.p.	n.p.
10041	Ocean	2	n.p.	n.p.	n.p.	1	n.p.	n.p.	n.p.
10042	Geothermal	1	n.p.	n.p.	n.p.	1	n.p.	n.p.	n.p.
10052	Biomass	8	1,047	830	218	10	1,711	1,711	-
10049	Other sources and new vectors	10	1,178	988	190	10	2,106	n.p.	n.p.
	Total other primary sources	30	2,610	2,130	480	33	4,532	3,979	553
TOTAL PRODUCTION AND UTILISATION OF ENERGY									
		133	53,837	42,603	11,234	160	54,746	45,066	9,681

See footnotes at end of table.

TABLE 37. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES(a), AUSTRALIA
DETAILS OF RESOURCES DEVOTED TO ENERGY R & D BY ENERGY OBJECTIVE CODE-Continued

Energy objective code		1984-85 ^r				1986-87			
Code	Description	Enterprises(b) (number)	Total Expenditure (\$'000)	Source of funds		Enterprises(b) (number)	Total Expenditure (\$'000)	Source of funds	
				Industry(c) (\$'000)	Government(d) (\$'000)			Industry(c) (\$'000)	Government(d) (\$'000)
<i>Conservation of energy</i>									
10060	Industry	64	3,978	3,153	825	70	6,848	5,975	873
10062	Residential and commercial	25	2,602	2,311	291	39	4,844	4,203	641
10064	Transportation	14	n.p.	n.p.	n.p.	22	n.p.	n.p.	n.p.
10069	Other	20	n.p.	n.p.	n.p.	13	n.p.	n.p.	n.p.
TOTAL CONSERVATION OF ENERGY		101	13,546	10,952	2,595	117	23,606	21,685	1,921
<i>Other energy R & D</i>									
10070	Electric power conversion	17	789	722	67	18	3,039	2,709	330
10072	Electricity transmission and distribution	16	3,739	3,311	429	27	3,377	3,188	189
10074	Energy storage n.e.c.	8	753	n.p.	n.p.	7	1,254	n.p.	n.p.
10076	Energy systems analysis	8	n.p.	n.p.	n.p.	10	213	n.p.	n.p.
10079	Other	2	n.p.	n.p.	n.p.	8	2,849	n.p.	n.p.
TOTAL OTHER ENERGY R & D		44	6,458	5,840	618	61	10,732	10,091	640
TOTAL		247	73,841	59,395	14,447	298	89,084	76,842	12,242
Private sector contribution		235	64,411	51,017	13,395	282	72,288	62,297	9,991
Public sector contribution		12	9,430	8,378	1,052	16	16,797	14,546	2,251

(a) Excludes enterprises in ASIC Division 'A' (b) Where the R & D performed by an enterprise was directed towards more than one energy objective, that enterprise is counted in each of the energy objective codes to which its energy is coded. Therefore, the enterprise counts shown in this table cannot be summed to aggregates for combinations of energy objective codes. (c) Includes private and public business enterprises and private non-profit organisations (d) Includes Commonwealth and State Government organisations, universities and colleges of advanced education (e) Details of energy objective codes included in these categories are available from ABS.

TABLE 38. ENERGY RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES(a), AUSTRALIA, 1986-87
DETAILS OF RESOURCES DEVOTED TO ENERGY R & D BY INDUSTRY OF ENTERPRISE

Industry of enterprise		Expenditure (\$'000)					Human resource effort (person years)			
		Enterprises (number)	Type of expenditure				Type of employee			
ASIC Code	Description		Total	Capital expenditure	Wages and salaries(b)	Other current expenditure	Total	Researchers	Technicians	Other supporting staff
11-15	MINING (excluding services to mining)	18	12,917	1,213	4,522	7,182	98	36	43	19
	Manufacturing -									
21	Food, beverages and tobacco	6	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
23-24	Textiles, clothing and footwear	1	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
25	Wood, wood products and furniture	1	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
26	Paper, paper products, printing and publishing	3	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
27	Chemical, petroleum and coal products	12	1,788	451	955	382	25	20	4	1
28	Non-metallic mineral products	6	409	83	214	112	6	4	2	1
29	Basic metal products	7	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
31	Fabricated metal products	11	1,687	n.p.	861	n.p.	27	11	8	8
32	Transport equipment	7	730	n.p.	291	n.p.	9	4	2	4
334	Photographic, professional and scientific equipment	2	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
335	Appliances and electrical equipment	72	7,944	874	4,240	2,830	169	103	45	21
336	Industrial machinery and equipment	20	2,627	73	1,550	1,004	43	13	21	9
34	Miscellaneous manufacturing	5	1,518	n.p.	441	n.p.	11	5	3	3
C	TOTAL MANUFACTURING	153	25,031	3,549	13,016	8,466	401	219	117	65
	Other industries -									
F	Wholesale and retail trade	13	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
63	Property and business services	71	20,463	2,179	9,961	8,324	271	82	141	49
8461	Research and scientific institutions	11	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
(c)	Other n.e.c.	32	20,334	2,518	9,027	8,789	229	119	78	32
16, D-L	TOTAL OTHER INDUSTRIES	127	51,137	5,525	24,392	21,220	677	294	260	122
	TOTAL ALL INDUSTRIES	298	89,084	10,287	41,930	36,868	1,176	549	421	206
	Private sector contribution to 'Total all industries' -									
1986-87		282	72,288	7,545	34,206	30,537	981	447	351	183
1984-85		235	64,411	12,420	30,041	21,950	887	385	326	175

(a) Excludes enterprises in ASIC Division 'A'. (b) Wages and Salaries includes other labour costs ie overtime earnings, shift allowances, penalty rates, bonuses, commission payments, holiday pay, long service leave payments, employer contributions to superannuation and pension schemes. (c) ASIC Codes 16,D,E,G,H,61-62,J,8141-8306,8462-8495,L.

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