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**RESEARCH AND EXPERIMENTAL  
DEVELOPMENT**

**BUSINESS ENTERPRISES  
AUSTRALIA  
1981-82**

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## **PREFACE**

This publication presents statistics on research and experimental development (R & D) compiled from data collected from a survey of business enterprises in Australia in respect of 1981-82. The survey was conducted by the ABS and forms part of the Department of Science and Technology's Project SCORE (Survey and Comparisons of Research Expenditures). The main purpose of Project SCORE is to measure the financial and manpower resources devoted to Australian R & D.

Comparable information is collected and compiled by the ABS for the General Government, Private Non-profit and Higher Education Sectors. Preliminary results for the Business Enterprise and General Government Sectors were published in April and October 1983 respectively. Comprehensive results for the Higher Education Sector (in respect of calendar year 1981) and the General Government Sector were published in October 1983 and January 1984 respectively. Results for the private Non-profit Sector together with the All Sector Summary are expected to be published in March 1984. More detailed information is available upon request.

Previous Project SCORE surveys were conducted for 1968-69, 1973-74, 1976-77 and 1978-79.

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## MAIN FEATURES

The estimate of expenditure on R & D carried out in Australia by business enterprises during 1981-82 was \$341m at *current* prices. This represents a 39% increase in expenditure compared with 1978-79. At constant (average 1979-80) prices R & D expenditure is estimated to have decreased by 2% between these years.

Expenditure by private enterprises was \$286m and by public sector business enterprises was \$55m at *current* prices. At constant (average 1979-80) prices this represents a 4% decrease in R & D expenditure by private enterprises and a 3% increase by public sector business enterprises.

The manpower effort devoted to R & D carried out in Australia by business enterprises during 1981-82 was 7,923 man years. This represents a decrease of 8% compared with 1978-79.

Payments for technical know-how by business enterprises in Australia in 1981-82 were \$127m (an increase of 17% at *current* prices, compared with 1978-79). Receipts for technical know-how by business enterprises in Australia in 1981-82 were \$17m (an increase of 13% at *current* prices compared with 1978-79).

## EXPLANATORY NOTES

### Introduction

This publication presents revised statistics on the level and distribution of expenditure and manpower resources devoted to research and experimental development (R & D) carried out in Australia by business enterprises during 1981-82. (Tables 1 to 13) they replace the preliminary estimates previously published on 5 April 1983. These statistics do not measure directly the amount of R & D activity *funded* by business enterprises, nor the amount of R & D activity carried out on account of business enterprises. An approximate indication of these two measures can however be derived from the statistics of source of funds for R & D carried out by business enterprises (Tables 4 and 9) and the statistics of extramural R & D funded by business enterprises but carried out by other organisations (Tables 14 and 15).

2. Statistics of payments and receipts for technical know-how by business enterprises are shown in Tables 16 to 20. They can be considered as providing an indication of the value of purchases and sales of knowledge arising from previous R & D activity.

3. Statistics of patent applications by, and patents granted to, business enterprises with R & D activity are shown in Table 21. These figures might be regarded as providing an imperfect indication of the volume of output of the R & D process.

### Data sources

4. Most of the statistics presented in this publication were derived from data collected from business enterprises in the Survey of Research and Experimental Development in respect of the year ended 30 June 1982. This survey was conducted by the ABS, by means of mailed questionnaires, and a 99% response was obtained.

5. The 1973-74 statistics shown in Table 1 and 1976-77 and 1978-79 statistics shown in other tables were derived from similar surveys conducted by the ABS. A number of revisions have been made to the 1973-74, 1976-77 and 1978-79 statistics since they were first published.

6. The statistics of value added and turnover shown in Tables 3 and 6 to 8 were obtained from the ABS Mining and Manufacturing Censuses for 1981-82. These censuses were also the source of the majority of data on the number of enterprises and persons employed relating to the whole industry (as opposed to R & D performers only) used in the calculation of the two R & D intensity measures shown in the last two columns of Table 3. The data used to calculate the intensities for enterprises other than mining and manufacturing were obtained within the ABS from a variety of sources.

### 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. To be classified as R & D, an activity should contain an appreciable amount of novelty or innovation, should have investigation as a primary objective, and should have a potential to produce results that recognisably increase mankind's stock of knowledge. The concept of novelty is not associated with the actual creation of something which, although new, is made by artistry or by application of techniques that have already been established for that class of object. R & D activity extends to substantial modifications to existing products or processes. R & D ceases and pre-production begins when work is not longer experimental.

9. *Intramural R & D activities*, for which data are provided in Tables 1 to 13 relating to expenditure and manpower effort, refer to R & D projects carried out in Australia by business enterprises on their own behalf or on behalf of other enterprises, institutions or individuals. *Extramural R & D activities* for which data are provided in Tables 14 and 15 relating only to expenditure, refer to R & D projects funded by business enterprises but carried out by other enterprises, institutions or individuals, either in Australia or overseas. Extramural expenditure includes amounts payable by business enterprises specifically for such projects.

10. *R & D expenditure* includes capital expenditure on the acquisition (less disposals) of fixed tangible assets such as land, buildings, vehicles, plant, machinery and equipment, and current expenditure on such items as wages, salaries, materials, fuels, rent and leasing, repairs and maintenance, data processing, etc., and a proportion of expenditure on general services and overhead costs attributable to the R & D effort. Respondents were asked to report data on an accruals basis of accounting.

11. The item *man years of effort on R & D* includes the effort of researchers, technicians and other staff directly supporting R & D. *Overhead staff*, i.e. administrative and general services employees such as personnel officers, canteen staff, pay clerks, janitors, cleaners, groundsmen, etc., whose work indirectly supports R & D, are excluded.

12. *Researchers* refers to persons actually engaged in the conception and/or creation of new knowledge, products, processes, methods and systems. *Technicians* refers to persons performing technical tasks in support of R & D, normally under the direction and supervision of a researcher. These tasks include assisting with or performing experiments, tests and analyses; preparing materials and equipment for experiments, taking records, making calculations and preparing charts and graphs; maintaining and operating advanced machinery and equipment; interviewing in social science surveys; and computer programming. *Other supporting staff* refers to skilled and unskilled craftsmen, secretarial and clerical staff working on or directly associated with R & D.

13. *Basic research* is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use in view. *Pure basic research* is research which is carried out without looking for long term economic or social benefits other than advancement of knowledge. It includes all Humanities R & D. *Strategic basic research* is research, 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. *Applied research* also refers to original investigation undertaken in order to acquire new knowledge. It is, however directed towards a specific practical aim or objective. Applied research is undertaken either to determine possible uses for the findings of basic research or to determine new methods or ways of achieving some specific and predetermined objectives. *Experimental development* refers to systematic work, drawing on existing knowledge gained from research and/or practical experience, that is directed to producing new materials, products and devices, to installing new processes and improving substantially those already produced or installed. In the social sciences, experimental development may be defined as the process of translating knowledge gained through research into operational programs including demonstration projects for testing and evaluation.

14. *Turnover* is defined as sales of goods, commission revenue, repair and service revenue, rent, leasing and hiring revenue, government bounties and subsidies and all other operating revenue except interest, royalties and dividends. Also included is the value of capital work done by the enterprise for itself and the value of equipment withdrawn from stock for own use or for rental or lease outside the enterprise. Rent, leasing and hiring revenue reported by the enterprise has, where possible, been allocated to component establishments of the enterprise. That part which is unallocated is excluded from turnover and the calculation of value added.

15. *Value added* is defined as turnover, plus increase (or less decrease) in the value of stocks, less purchases and selected expenses. It may be regarded as a basic measure of an enterprise's unduplicated contribution to total economic activity. For a fuller definition, and the relationship of value added to gross product at factor cost, see *Integrated Economic Censuses: 1980-81 Enterprise Statistics* (8103.0).

16. *R & D intensity of enterprises that carried out R & D* is shown in this publication in two forms:

(a) *R & D intensity (expenditure)* is defined as expenditure on R & D carried out within the enterprise as a percentage of the turnover of those enterprises that carried out R & D.

(b) *R & D intensity (manpower)* is defined as man years of effort expended on R & D as a percentage of the number of persons employed by those enterprises that carried out R & D.

17. *R & D intensity of all enterprises in industry* is also shown in two forms:

(a) *R & D intensity (enterprises)* is defined as the number of enterprises that carried out R & D as a percentage of the total number of enterprises in the industry.

(b) *R & D intensity (manpower)* is defined as the number of man years of effort expended on R & D as a percentage of the number of persons employed by all enterprises in the industry. *Persons employed* comprises employees (including part-time and casual employees) on the payroll, working proprietors and working partners.

18. For a more comprehensive interpretation of the definitions of R & D or an explanation of other definitions not covered above contact the ABS or refer to the OECD publication. *The Measurement of Scientific and Technical Activities* ('Frascati Manual', 1980), OECD, Paris, 1981.

#### Sector classification

19. The sector classification used in the compilation of these statistics is adapted from the guidelines specified by the OECD for use in the conduct of R & D studies. Four institutional sectors are recognised: Business Enterprises, General Government, Private Non-profit and Higher Education.

### Scope and units

20. The statistics in this publication relate, in principal, to all business enterprises within the scope of the Business Enterprise Sector in Australia. For the purposes of Australian R & D surveys of this Sector the organisational unit for the collection of 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).

21. *The Business Enterprise Sector* is defined (in accordance with the OECD guidelines mentioned above) as including:

- (1) all firms, organisations and institutions whose primary activity is the production of goods or services for sale to the general public at a price intended approximately to cover at least the cost of production, and
- (2) the private non-profit institutes mainly serving them.

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

23. In the case of the patent applications statistics, shown in Table 21, the scope is restricted to those enterprises that either carried out R & D or funded other enterprises, institutions or individuals to do so during 1981-82.

### Coverage and Survey Methodology

24. The 1981-82 Survey of R & D comprised a complete enumeration of business enterprises identified by the ABS as likely during 1981-82 to have:

- (a) carried out R & D (Tables 1 to 13 and 21); or
- (b) funded R & D activity to be carried out by other enterprises, institutions or individuals (Tables 14, 15 and 21); or
- (c) had receipts or payments for patent rights or other technical know-how (Tables 16 to 20).

25. Within the scope and coverage 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;
  - (ii) employing 140 persons or more; or
  - (iii) mainly engaged in providing consultant engineering or technical services (ASIC Class 6336), or with establishments thus engaged; or

- (iv) mainly engaged in scientific research (ASIC Class 8461), or with establishments thus engaged; or

- (v) having locations predominantly engaged in laboratory or testing work on behalf of establishments of the enterprise.

- (b) Enterprises which were members of major industrial research associations.

- (c) Enterprises which had applied for grants from the Australian Industrial Research and Development Incentives Board (AIRDIB) in recent years.

- (d) Enterprises responding to the 1973-74, 1976-77 and 1978-79 Surveys of R & D that reported R & D activity.

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

26. However, some enterprises were excluded from the collection if information was available to indicate that no R & D was carried out, even though they satisfied one or more of the inclusion criteria listed above.

27. Statistics relating to enterprises mainly engaged in agriculture, forestry, fishing and hunting (i.e. industries in Division A of the *Australian Standard Industrial Classification* (ASIC), 1978 edition) are excluded from this publication, partly because of the collection difficulties which would have been involved in including them in the Survey of R & D and partly because such enterprises are believed to have very low R & D activity (agricultural R & D is carried out predominantly in specialised research institutes not included in ASIC Division A).

28. For similar reasons, statistics relating to individual inventors working in their own time and with their own facilities are not, in general, included in the publication.

29. To provide a coverage check of the enterprises included in the main 1981-82 survey collection, a separate sample survey of the remaining private enterprises on the central register was conducted. Data obtained from the returns of these 5,500 sample informants indicate that the main collection accounts for 97 per cent of the total expenditure on R & D activity carried out by enterprises. Since this coverage percentage is an estimate derived from the returns of sample informants, it is subject to sampling variability. Measurement of the sampling variability indicates that there are 19 chances in 20 that the coverage in fact exceeds 95 per cent. Coverage has not been estimated for individual industries or individual component items of total R & D expenditure, but for some of these more disaggregated statistics it may be considerably lower than 97 per cent. Coverage of the number of enterprises with R & D activity is much lower than the coverage of expenditure; the main collection is estimated to have covered 72 per cent of enterprises (19 chances in 20 that it exceeds 59 per cent).

30. It is estimated that the main collection accounts for 99 per cent of expenditure on R & D funded by enterprises but carried out by other organisations (19 chances in 20 that it exceeds 99 per cent), 99 per cent of payments for technical know-how (19 chances in 20 that it exceeds 98 per cent) and 99 per cent of receipts for technical know-how (19 chances in 20 that it exceeds 99 per cent).

31. *The R & D statistics for 1981-82 contained in this publication relate only to the enterprises included in the main collection* (as described above in paragraphs 24 and 25). They do not include estimates based on the results obtained from the sample survey conducted for coverage checking purposes.

### Classification

32. Most of the statistical information in this publication is classified by industry of enterprise in accordance with the 1978 edition of the Australian Standard Industrial Classification (ASIC). 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. The industry classification of an enterprise is determined on the basis of the industry classifications of the establishments of the enterprise weighted by the value added by these establishments or by some substitute weight such as total employment. For further comment see the *Australian Standard Industrial Classification, 1978, Volume 1* (1201.0).

33. Tables 12 and 13 contain a supplementary classification of R & D expenditure by the industry of the product (or process) field towards which the R & D effort was directed. This involved asking each respondent to list the broad categories of product towards which his R & D was directed, and to apportion his expenditure on R & D to these categories. Each of these categories was then keyed to the ASIC industry by which it is mainly produced. For example, an enterprise (itself classified to the mining industry) may have performed R & D to develop a more efficient ore crusher. As manufacturing of ore crushers is an activity primary to ASIC Class 3369, manufacturing of 'Industrial machinery and equipment n.e.c.', in the 1978 edition of the ASIC, R & D expenditure directed towards this product would therefore have been classified to ASIC Class 3369 in Tables 12 and 13. Because of the way in which products were described by the respondent, there were some instances where it was difficult to classify products (and particularly processes) to an ASIC industry; a degree of subjectivity is associated with the classification in these cases.

34. It was not possible in every instance to provide a full industry description in the tables. The full ASIC classification is shown in the publication referred to in paragraph 32.

### Constant price estimates

35. Estimates of total R & D expenditure for four survey years are shown at both current and constant (average 1979-80) prices in Table 1. In concept, constant price estimates are measures from which the direct effects of price change have been eliminated. Although expressed

in monetary terms, the constant price measures shown in this publication 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 (1979-80). Because the measures relate to input quantities, they do not reflect changes in the efficiency with which labour, capital and other inputs are used.

36. The estimates of the wages, salaries and other labour cost components of these constant price estimates were obtained by multiplying, for each broad category of labour, the quantity (man years) of labour used in each period by the relevant average labour cost in the base period. The non-labour cost components were estimated by deflating each current price value by a composite price index of relevant materials or capital expenditure items. In revaluing R & D expenditure, extensive use has been made of price series used in deriving constant price national accounts estimates.

37. For a more comprehensive description of constant price concepts and estimation procedures see *Australian National Accounts: Concepts, Sources and Methods* (5216.0).

### Reliability of statistics

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

- (a) Many respondents do not record data on R & D activity and on receipts and payments for technical know-how separately in their accounts, and as a result needed to make estimates when completing the survey questionnaire.
- (b) The OECD standard definition of research and experimental development (R & D) used for the survey differs in some respects from what particular businesses may regard as research and development, particularly since grants by the Australian Industrial Research and Development Incentives Board are not available in respect of all the types of R & D that come within the survey definition.

### Related publications

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

*Research and Experimental Development, Business Enterprises, Australia, 1981-82 (Preliminary)* (8105.0)

*Research and Experimental Development, General Government Organisations, Australia, 1981-82* (8109.0)

*Research and Experimental Development, Higher Education Organisations, Australia, 1981* (8111.0)

*Research and Experimental Development, Business Enterprises, Australia, 1978-79* (8104.0)

*Research and Experimental Development, All Sector Summary, Australia, 1978-79* (8112.0)



*Research and Experimental Development, Energy Production, Utilisation and Conservation, All Sectors, Australia, 1979-80* (8110.0)

*Science and Technology Statement: 1982-83* (Department of Science and Technology, Canberra, Australia, 1983)

*The Measurement of Scientific and Technical Activities ('Frascati Manual' 1980)* OECD, Paris 1981.

40. The publication, *Research and Experimental Development, All Sector Summary, Australia, 1981-82* (8112.0) incorporating results for the Private Non-profit Sector will be published shortly.

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.

42. Copies of questionnaires used in the 1981-82 Surveys of Research and Experimental Development are available on request from the ABS by phoning (062) 52 5487.

#### Symbols and other usages

r revised

n.a. not available

n.e.c. not elsewhere classified

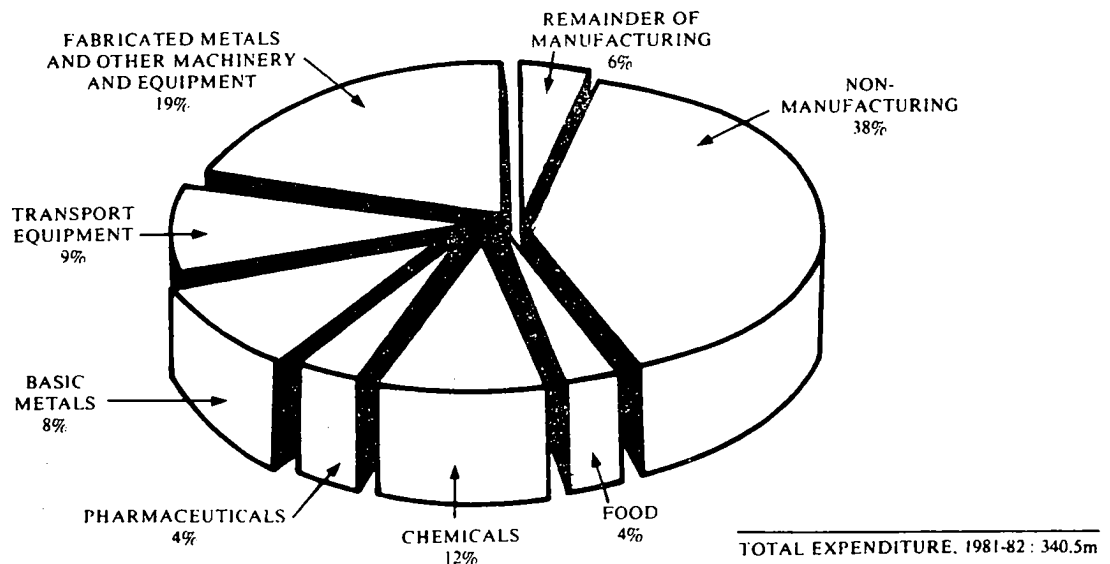
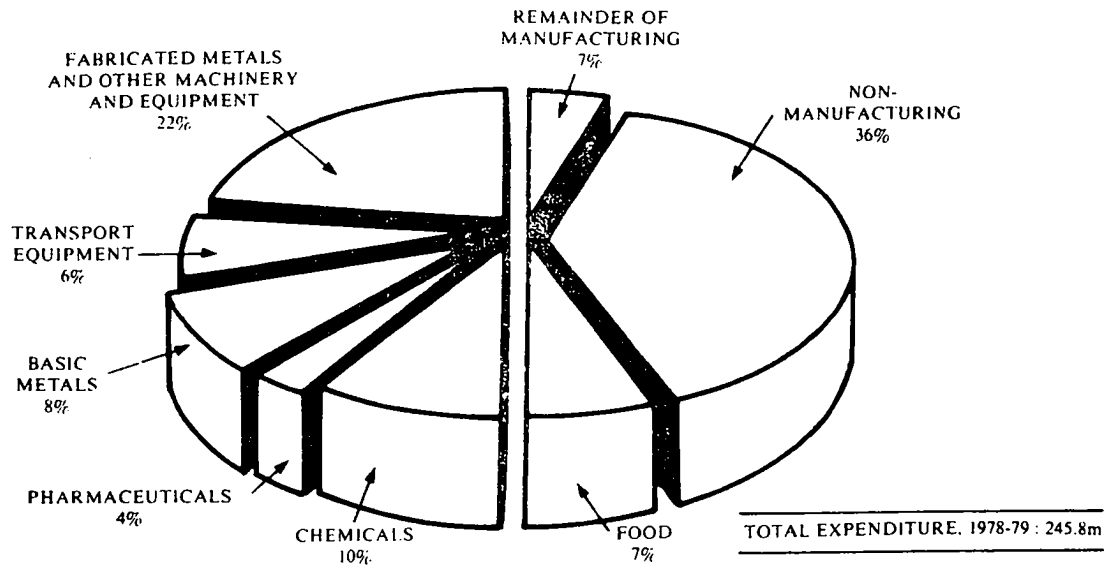
ASIC Australian Standard Industrial Classification

n.p. not available for separate publication (but included in totals where applicable)

— nil or less than half the final digit shown

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

**RESEARCH AND EXPERIMENTAL DEVELOPMENT  
CARRIED OUT BY BUSINESS ENTERPRISES—AUSTRALIA, 1978-79 AND 1981-82  
R & D EXPENDITURE BY INDUSTRY OF ENTERPRISE(a)**



**TABLE 1. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES(a)  
EXPENDITURE AT CURRENT AND CONSTANT PRICES  
(\$m)**

|   | 1973-74     | 1976-77      | 1978-79      | 1981-82      |
|---|-------------|--------------|--------------|--------------|
| <b>AT CURRENT PRICES</b>                    |             |              |              |              |
| Private enterprises                         | (b)190.4    | 160.4        | 205.8        | 285.7        |
| Public sector business enterprises          | n.a.        | 42.4         | 40.0         | 54.8         |
| <b>Total business enterprises</b>           | <b>n.a.</b> | <b>202.8</b> | <b>245.8</b> | <b>340.5</b> |
| <b>AT CONSTANT (AVERAGE 1979-80) PRICES</b> |             |              |              |              |
| Private enterprises                         | (b)409.8    | 215.6        | 226.5        | 218.4        |
| Public sector business enterprises          | n.a.        | 54.7         | 44.0         | 45.4         |
| <b>Total business enterprises</b>           | <b>n.a.</b> | <b>270.3</b> | <b>270.5</b> | <b>263.8</b> |

(a) Excludes enterprises in ASIC Division A. (b) Sample survey; the standard error expressed in \$m is \$16.0m.

**TABLE 2. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES(a), AUSTRALIA  
R & D EXPENDITURE AND R & D MANPOWER BY INDUSTRY OF ENTERPRISE(b) 1976-77, 1978-79 AND 1981-82**

| ASIC code | Industry of enterprise(b)<br>Description            | Enterprises that<br>carried out R & D<br>(number) |         |         | R & D expenditure<br>(\$m) |         |         | Man years of<br>effort on R & D |         |         |
|-----------|---|---|---------|---------|----------------------------|---------|---------|---------------------------------|---------|---------|
|           |   | 1976-77   | 1978-79 | 1981-82 | 1976-77                    | 1978-79 | 1981-82 | 1976-77                         | 1978-79 | 1981-82 |
| 11-15     | Mining (excluding services to mining)               | 22  | 17      | 23      | 7.0                        | 9.7     | 22.6    | 446                             | 315     | 381     |
|           | <b>Manufacturing—</b>                               |   |         |         |                            |         |         |                                 |         |         |
| 21        | Food, beverages and tobacco                         | 69  | 84      | 69      | 11.6                       | 16.1    | 13.1    | 551                             | 545     | 367     |
| 23-24     | Textiles, clothing and footwear                     | 27  | 22      | 16      | 2.1                        | 1.4     | 0.8     | 106                             | 42      | 24      |
| 25        | Wood, wood products and furniture                   | 22  | 24      | 19      | 0.9                        | 1.6     | 1.7     | 50                              | 55      | 43      |
| 26        | Paper, paper products, printing and publishing      | 16  | 14      | 12      | 3.3                        | 4.1     | 5.3     | 149                             | 144     | 125     |
| 27        | Chemicals, petroleum and coal products              | 115   | 118     | 124     | 27.1                       | 35.2    | 53.1    | 1,335                           | 1,381   | 1,231   |
| 28        | Non-metallic mineral products                       | 32  | 27      | 22      | 3.8                        | 4.2     | 4.8     | 169                             | 154     | 109     |
| 29        | Basic metal products                                | 36  | 35      | 27      | 19.0                       | 20.9    | 27.4    | 903                             | 776     | 673     |
| 31        | Fabricated metal products                           | 74  | 81      | 80      | 4.0                        | 4.5     | 6.7     | 228                             | 198     | 161     |
| 32        | Transport equipment                                 | 44  | 47      | 51      | 14.6                       | 15.6    | 31.9    | 761                             | 604     | 903     |
| 334       | Photographic, professional and scientific equipment | 20  | 16      | 25      | 4.6                        | 6.7     | 5.1     | 232                             | 230     | 160     |
| 335       | Appliances and electrical equipment                 | 129   | 120     | 156     | 21.1                       | 33.1    | 37.2    | 1,209                           | 1,234   | 899     |
| 336       | Industrial machinery and equipment                  | 141   | 128     | 153     | 8.2                        | 8.8     | 14.7    | 425                             | 388     | 413     |
| 33        | Total other machinery and equipment                 | 290   | 264     | 334     | 33.9                       | 48.6    | 56.9    | 1,866                           | 1,851   | 1,472   |
| 34        | Miscellaneous manufacturing                         | 57  | 58      | 65      | 3.5                        | 5.9     | 7.3     | 185                             | 210     | 180     |
| C         | <b>Total manufacturing</b>                          | 782   | 774     | 819     | 123.9                      | 158.1   | 209.1   | 6,306                           | 5,960   | 5,287   |
|           | <b>Other Industries—</b>                            |   |         |         |                            |         |         |                                 |         |         |
| F         | Wholesale and retail trade                          | 90  | 112     | 103     | 9.2                        | 11.4    | 11.9    | 381                             | 390     | 290     |
| 63        | Property and business services                      | 182   | 169     | 203     | 11.2                       | 14.2    | 18.5    | 532                             | 472     | 465     |
| 8461      | Research and scientific institutions                | 30  | 29      | 28      | 11.7                       | 13.3    | 21.8    | 504                             | 460     | 464     |
| (c)       | Other n.e.c.  | 62  | 85      | 70      | 39.8                       | 39.1    | 56.6    | 1,177                           | 1,030   | 1,034   |
| 16, D-I.  | <b>Total other industries</b>                       | 364   | 395     | 404     | 71.9                       | 78.0    | 108.8   | 2,594                           | 2,352   | 2,255   |
|           | <b>Total all industries</b>                         | 1,168   | 1,186   | 1,246   | 202.8                      | 245.8   | 340.5   | 9,343                           | 8,626   | 7,923   |

(a) Excludes enterprises in ASIC Division A. (b) 1978-79 and 1981-82 data are classified by the 1978 edition of ASIC; 1976-77 data are classified by the 1969 edition of ASIC. If the 1978 edition were used to classify the 1976-77 data shown here only minor differences would occur. (c) ASIC Codes 16, D, E, G-H, 61-62, J-I, excluding ASIC class 8461.

**TABLE 3. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA, 1981-82**  
**BROAD INDICATORS BY INDUSTRY OF ENTERPRISE**

| Industry of enterprise |  | Resources expended on R & D |                    |                    | Enterprises that carried out R & D |               |                 |                 |               | All enterprises in industry |               |
|------------------------|--|-----------------------------|--------------------|--------------------|------------------------------------|---------------|-----------------|-----------------|---------------|-----------------------------|---------------|
|                        |  | Expenditure                 | Man-power          |                    | Enterprises                        | Turn-over (a) | Value added (a) | R & D intensity |               | R & D intensity             |               |
|                        |  |                             | Re-searcher effort | Total R & D effort |                                    |               |                 | Expenditure (b) | Man-power (c) | Enterprises (d)             | Man-power (e) |
| ASIC code              | Description  | \$' 000                     | man-years          | man-years          | number                             | \$m           | \$m             | %               | %             | %                           | %             |
| <b>Mining—</b>         |  |                             |                    |                    |                                    |               |                 |                 |               |                             |               |
| 11                     | Metallic minerals                                    | 20,159                      | 150                | 354                | 17                                 | 2,221         | 1,213           | 0.9             | 1.5           | 4.7                         | 0.8           |
| 12-15                  | Non-metallic minerals                                | 2,426                       | 14                 | 27                 | 6                                  | 2,502         | 2,094           | 0.1             | 0.5           | 1.1                         | 0.1           |
| 11-15                  | Total mining (excl. services to mining)              | 22,585                      | 163                | 381                | 23                                 | 4,723         | 3,307           | 0.5             | 1.3           | 2.5                         | 0.5           |
| <b>Manufacturing—</b>  |  |                             |                    |                    |                                    |               |                 |                 |               |                             |               |
| 211                    | Meat products  | 511                         | 5                  | 11                 | 5                                  | 162           | 74              | 0.3             | 0.4           | 0.7                         | —             |
| 212                    | Milk products  | 2,934                       | 56                 | 96                 | 15                                 | 1,385         | 433             | 0.2             | 0.7           | 8.2                         | 0.4           |
| 213                    | Fruit and vegetable products                         | 1,181                       | 26                 | 34                 | 10                                 | 413           | 160             | 0.2             | 0.8           | 6.3                         | 0.3           |
| 215-216                | Flour and cereal products, bread, cakes and biscuits | 3,188                       | 45                 | 75                 | 11                                 | 674           | 219             | 0.5             | 1.0           | 8.9                         | 0.2           |
| 214, 217               | Margarine, oils, fats and other food products        | 3,855                       | 66                 | 99                 | 19                                 | 751           | 261             | 0.5             | 1.5           | 3.0                         | 0.3           |
| 218-219                | Beverages, malt and tobacco products                 | 1,455                       | 24                 | 52                 | 9                                  | 743           | 383             | 0.2             | 0.9           | 1.6                         | 0.2           |
| 21                     | Total food, beverages and tobacco                    | 13,124                      | 221                | 367                | 69                                 | 4,127         | 1,530           | 0.3             | 0.9           | 2.9                         | 0.2           |
| 234                    | Textile fibres, yarns and woven fabrics              | 286                         | 3                  | 8                  | 7                                  | 240           | 104             | 0.1             | 0.1           | 2.7                         | —             |
| 235, 24                | Other textile products and clothing and footwear     | 499                         | 6                  | 16                 | 9                                  | 93            | 37              | 0.5             | 1.2           | 0.3                         | —             |
| 23-24                  | Total textiles, clothing and footwear                | 785                         | 9                  | 24                 | 16                                 | 333           | 142             | 0.2             | 0.4           | 0.4                         | —             |
| 25                     | Wood, wood products and furniture                    | 1,719                       | 16                 | 43                 | 19                                 | 269           | 119             | 0.6             | 1.2           | 0.2                         | —             |
| 263                    | Paper and paper products                             | 5,188                       | n.p.               | 122                | 9                                  | 1,203         | 498             | 0.6             | 1.0           | 3.8                         | 0.4           |
| 264                    | Printing and allied industries                       | 67                          | n.p.               | 3                  | 3                                  | 10            | 5               | 0.4             | 1.1           | —                           | —             |
| 26                     | Total paper, paper products, printing and publishing | 5,255                       | 59                 | 125                | 12                                 | 1,212         | 503             | 0.7             | 1.0           | 0.3                         | 0.1           |
| 2753                   | Synthetic resins and rubber                          | 2,646                       | 44                 | 73                 | 9                                  | 499           | 159             | 0.4             | 2.0           | 14.5                        | 1.4           |
| 2754-2755              | Organic and inorganic industrial chemicals n.e.c.    | 22,046                      | 248                | 449                | 17                                 | 1,303         | 487             | 0.5             | 4.5           | 14.3                        | 3.7           |
| 2762                   | Paints   | 7,016                       | 93                 | 200                | 15                                 | 432           | 185             | 1.7             | 3.7           | 10.1                        | 2.3           |
| 2763                   | Pharmaceutical and veterinary products               | 13,528                      | 125                | 278                | 28                                 | 542           | 250             | 1.6             | 4.3           | 20.0                        | 2.5           |
| (f)                    | Other chemical, petroleum and coal products          | 7,878                       | 148                | 231                | 55                                 | 1,577         | 703             | 0.5             | 1.6           | 8.7                         | 0.7           |
| 27                     | Total chemical, petroleum and coal products          | 53,114                      | 659                | 1,231              | 124                                | 4,354         | 1,783           | 1.2             | 3.1           | 12.4                        | 1.7           |
| 287                    | Cement and concrete products                         | 987                         | 16                 | 32                 | 7                                  | 288           | 137             | 0.3             | 0.9           | 0.9                         | 0.2           |
| 285-286, 288           | Glass, clay and other non-metallic mineral products  | 3,839                       | 33                 | 77                 | 15                                 | 631           | 384             | 0.6             | 0.8           | 1.9                         | 0.2           |
| 28                     | Total non-metallic mineral products                  | 4,826                       | 49                 | 109                | 22                                 | 920           | 520             | 0.5             | 0.8           | 1.4                         | 0.2           |
| 294                    | Basic iron and steel                                 | 22,954                      | 255                | 577                | 14                                 | 4,574         | 2,051           | 0.5             | 0.9           | 4.0                         | 0.7           |
| 295-296                | Basic non-ferrous metals                             | 4,405                       | 45                 | 96                 | 13                                 | 1,284         | 385             | 0.3             | 1.0           | 5.2                         | 3.7           |
| 29                     | Total basic metal products                           | 27,359                      | 300                | 673                | 27                                 | 5,857         | 2,436           | 0.5             | 1.0           | 4.5                         | 0.6           |

For footnotes see end of table.

**TABLE 3. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA, 1981-82**  
**BROAD INDICATORS BY INDUSTRY OF ENTERPRISE—continued**

| Industry of enterprise |  | Resources<br>expended on R & D |                           |                          | Enterprises that carried out R & D |                      |                       |                         | All enterprises<br>in industry |                 |
|------------------------|--|--------------------------------|---------------------------|--------------------------|------------------------------------|----------------------|-----------------------|-------------------------|--------------------------------|-----------------|
|                        |  | Man-power                      |                           |                          | Enter-<br>prises                   | Turn-<br>over<br>(a) | Value<br>added<br>(a) | R & D intensity         |                                | R & D intensity |
|                        |  | Expen-<br>diture               | Re-<br>searcher<br>effort | Total<br>R & D<br>effort |                                    |                      |                       | Expen-<br>diture<br>(b) | Man-<br>power<br>(c)           |                 |
| ASIC code              | Description  | \$' 000                        | man-<br>years             | man-<br>years            | number                             | \$m                  | \$m                   | %                       | %                              | %               |
| 314                    | Structural metal products  | 1,512                          | 14                        | 27                       | 15                                 | 338                  | 115                   | 0.4                     | 0.8                            | 0.6             |
| 315                    | Sheet metal products   | 2,039                          | 22                        | 37                       | 24                                 | 326                  | 140                   | 0.6                     | 0.8                            | 0.1             |
| 316                    | Other fabricated metal products  | 3,177                          | 40                        | 96                       | 41                                 | 534                  | 262                   | 0.6                     | 1.0                            | 0.2             |
| 31                     | Total fabricated metal products  | 6,729                          | 76                        | 161                      | 80                                 | 1,198                | 517                   | 0.6                     | 0.9                            | 0.1             |
| 323                    | Motor vehicles and parts   | 29,725                         | 215                       | 853                      | 34                                 | 2,806                | 1,097                 | 1.0                     | 2.0                            | 1.0             |
| 324                    | Other transport equipment  | 2,209                          | 22                        | 50                       | 17                                 | 227                  | 124                   | 1.0                     | 0.9                            | 0.3             |
| 32                     | Total transport equipment  | 31,933                         | 237                       | 903                      | 51                                 | 3,033                | 1,221                 | 1.1                     | 1.8                            | 0.9             |
| 334                    | Photographic, professional and scientific equipment                          | 5,083                          | 83                        | 160                      | 25                                 | 95                   | 53                    | 5.4                     | 7.8                            | 4.5             |
| 3351-3352              | Radio and T.V. receivers; audio equipment and<br>electronic equipment n.e.c. | 26,786                         | 196                       | 578                      | 62                                 | 1,005                | 159                   | 1.8                     | 0.6                            | 13.5            |
| 3353                   | Refrigerators and household appliances                                       | 4,489                          | 55                        | 141                      | 23                                 | 694                  | 605                   | 0.6                     | 1.8                            | 8.0             |
| 3354                   | Water heating systems  | 949                            | 8                         | 20                       | 7                                  | 41                   | 16                    | 2.3                     | 1.3                            | 13.5            |
| 3355-3357              | Other electrical machinery and equipment                                     | 4,984                          | 65                        | 160                      | 64                                 | 636                  | 277                   | 0.8                     | 3.8                            | 9.6             |
| 335                    | Total appliances and electrical equipment                                    | 37,208                         | 324                       | 899                      | 156                                | 2,376                | 1,058                 | 1.6                     | 1.3                            | 9.6             |
| 3361                   | Agricultural machinery   | 6,587                          | 65                        | 205                      | 29                                 | 704                  | 274                   | 0.9                     | 2.5                            | 8.2             |
| 3362                   | Construction machinery   | 304                            | 1                         | 6                        | 8                                  | 29                   | 10                    | 1.1                     | 1.7                            | 10.0            |
| 3363                   | Materials handling equipment   | 252                            | 5                         | 10                       | 11                                 | 26                   | 13                    | 1.0                     | 2.2                            | 4.8             |
| 3364-3369              | Other industrial machinery and equipment n.e.c.                              | 7,510                          | 84                        | 193                      | 105                                | 963                  | 433                   | 0.8                     | 1.2                            | 3.4             |
| 336                    | Total industrial machinery and equipment                                     | 14,654                         | 155                       | 414                      | 153                                | 1,721                | 730                   | 0.9                     | 1.6                            | 4.0             |
| 33                     | Total other machinery and equipment  | 56,945                         | 562                       | 1,472                    | 334                                | 4,192                | 1,841                 | 1.4                     | 5.6                            | 0.8             |
| 346                    | Rubber products  | 1,461                          | 22                        | 37                       | 11                                 | 1,307                | 504                   | 0.1                     | 0.2                            | 5.4             |
| 347                    | Plastic and related products   | 4,260                          | 48                        | 102                      | 37                                 | 359                  | 150                   | 1.2                     | 1.9                            | 3.1             |
| 345,348                | Leather, leather products and other manufacturing                            | 1,605                          | 24                        | 40                       | 17                                 | 69                   | 32                    | 2.3                     | 3.2                            | 0.6             |
| 34                     | Total miscellaneous manufacturing  | 7,326                          | 93                        | 180                      | 65                                 | 1,734                | 687                   | 0.4                     | 0.7                            | 1.6             |
| C                      | Total manufacturing  | 209,116                        | 2,280                     | 5,287                    | 819                                | 27,231               | 11,300                | 0.8                     | 1.5                            | 1.9             |
|                        | Other industries—  |                                |                           |                          |                                    |                      |                       |                         |                                |                 |
| E                      | Construction   | 2,761                          | 34                        | 51                       | 23                                 | n.a.                 | n.a.                  | n.a.                    | 0.9                            | —               |
| 47                     | Wholesale trade  | 11,499                         | 151                       | 277                      | 93                                 | n.a.                 | n.a.                  | n.a.                    | 1.1                            | 0.3             |
| 48                     | Retail trade   | 413                            | 8                         | 13                       | 10                                 | n.a.                 | n.a.                  | n.a.                    | 0.9                            | —               |
| F                      | Total wholesale and retail trade   | 11,912                         | 159                       | 290                      | 103                                | n.a.                 | n.a.                  | n.a.                    | 2.1                            | 0.1             |
| 63                     | Property and business services   | 18,509                         | 235                       | 466                      | 203                                | n.a.                 | n.a.                  | n.a.                    | 4.2                            | 0.3             |
| 8461                   | Research and scientific institutions   | 21,770                         | 192                       | 464                      | 28                                 | n.a.                 | n.a.                  | n.a.                    | 0.4                            | 13.2            |
| (g)                    | Other n.e.c.   | 53,853                         | 409                       | 983                      | 47                                 | n.a.                 | n.a.                  | n.a.                    | 1.0                            | n.a.            |
| 16, D-1.               | Total other industries   | 108,805                        | 1,029                     | 2,255                    | 404                                | n.a.                 | n.a.                  | n.a.                    | 0.7                            | 0.1             |
|                        | Total all industries(h)  | 340,507                        | 3,472                     | 7,923                    | 1,246                              | n.a.                 | n.a.                  | n.a.                    | 1.2                            | 0.2             |
|                        | Private business enterprise contribution to 'Total all industries'—          |                                |                           |                          |                                    |                      |                       |                         |                                |                 |
|                        | 1981-82  | 285,686                        | 3,054                     | 6,913                    | 1,212                              | n.a.                 | n.a.                  | n.a.                    | n.a.                           | n.a.            |
|                        | 1978-79  | 205,814                        | 3,186                     | 7,546                    | 1,144                              | n.a.                 | n.a.                  | n.a.                    | n.a.                           | n.a.            |

(a) Excludes data in respect of single establishment manufacturing enterprises with fewer than four persons employed at end of year. (b) Expenditure on R & D expressed as a percentage of the turnover of those enterprises that carried out R & D. (c) Man-years of effort expended on R & D as a percentage of the number of persons employed by those enterprises that carried out R & D. (d) Number of enterprises that carried out R & D expressed as a percentage of the total number of enterprises in the industry. (e) Man-years of effort expended on R & D as a percentage of the number of persons employed by all enterprises in the industry. (f) ASIC Classes 2751-2752, 2761, 2764-2780. (g) ASIC codes 16, D, G-H, 61-62, J, 8141-8306, 8462-9364. (h) Excludes ASIC Division A.

**TABLE 4. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA, 1981-82**  
**DETAILS OF R & D EXPENDITURE BY INDUSTRY OF ENTERPRISE**  
(\$' 000)

| Industry of enterprise |  | Type of expenditure |                     |                    |                           | Type of activity(a) |                  |                          | Source of funds(a) |  |                  |                                  |
|------------------------|--|---------------------|---------------------|--------------------|---------------------------|---------------------|------------------|--------------------------|--------------------|--|------------------|----------------------------------|
|                        |  | Total expenditure   | Capital expenditure | Wages and salaries | Other current expenditure | Basic research      | Applied research | Experimental development | Own funds          | Other private enterprises in Australia | Government funds | Other Australian and overseas(b) |
| ASIC code              | Description  |                     |                     |                    |                           |                     |                  |                          |                    |  |                  |                                  |
| 11                     | <b>Mining—</b>                                       |                     |                     |                    |                           |                     |                  |                          |                    |  |                  |                                  |
|                        | Metallic minerals                                    | 20,159              | 4,801               | 12,492             | 2,866                     | 358                 | 7,253            | 12,548                   | n.p.               | 2,176                                  | n.p.             | n.p.                             |
| 12-15                  | Non-metallic minerals                                | 2,426               | 842                 | 1,041              | 543                       | —                   | 1,200            | 1,227                    | n.p.               | —                                      | n.p.             | —                                |
| 11-15                  | Total mining (excl. services to mining)              | 22,585              | 5,643               | 13,533             | 3,409                     | 358                 | 8,453            | 13,775                   | 18,726             | 2,176                                  | n.p.             | n.p.                             |
|                        | <b>Manufacturing—</b>                                |                     |                     |                    |                           |                     |                  |                          |                    |  |                  |                                  |
| 211                    | Meat products  | 511                 | 226                 | n.p.               | n.p.                      | n.p.                | n.p.             | n.p.                     | n.p.               | —                                      | n.p.             | —                                |
| 212                    | Milk products  | 2,934               | 345                 | 1,709              | 880                       | 41                  | 2,029            | 864                      | 2,810              | n.p.                                   | n.p.             | —                                |
| 213                    | Fruit and vegetable products                         | 1,181               | 67                  | 819                | 295                       | n.p.                | n.p.             | 1,092                    | n.p.               | —                                      | n.p.             | —                                |
| 215-216                | Flour and cereal products, bread, cakes and biscuits | 3,188               | 494                 | 1,748              | 946                       | n.p.                | n.p.             | 1,440                    | 2,840              | —                                      | 349              | —                                |
| 214,217                | Margarine, oils, fats and other food products        | 3,855               | 833                 | 2,329              | 692                       | n.p.                | n.p.             | 1,847                    | 3,165              | —                                      | 689              | —                                |
| 218-219                | Beverages, malt and tobacco products                 | 1,455               | 314                 | n.p.               | n.p.                      | n.p.                | 872              | n.p.                     | 1,223              | —                                      | 231              | —                                |
| 21                     | Total food, beverages and tobacco                    | 13,124              | 2,278               | 7,834              | 3,013                     | 329                 | 6,541            | 6,255                    | 11,471             | n.p.                                   | n.p.             | —                                |
| 234                    | Textile fibres, yarns and woven fabrics              | 286                 | 10                  | 131                | 144                       | n.p.                | n.p.             | 233                      | n.p.               | —                                      | n.p.             | —                                |
| 235,24                 | Other textile products and clothing and footwear     | 499                 | 128                 | 240                | 131                       | n.p.                | n.p.             | 292                      | n.p.               | —                                      | n.p.             | —                                |
| 23-24                  | Total textiles, clothing and footwear                | 785                 | 138                 | 372                | 275                       | 145                 | 115              | 525                      | 594                | —                                      | 191              | —                                |
| 25                     | Wood, wood products and furniture                    | 1,719               | 219                 | 1,030              | 470                       | 91                  | 210              | 1,417                    | 1,525              | —                                      | 194              | —                                |
| 263                    | Paper and paper products                             | 5,188               | 642                 | n.p.               | n.p.                      | n.p.                | n.p.             | n.p.                     | 4,806              | —                                      | 382              | —                                |
| 264                    | Printing and allied industries                       | 67                  | —                   | n.p.               | n.p.                      | n.p.                | n.p.             | n.p.                     | 67                 | —                                      | —                | —                                |
| 26                     | Total paper, paper products, printing and publishing | 5,255               | 642                 | 3,434              | 1,179                     | 127                 | 3,108            | 2,019                    | 4,873              | —                                      | 382              | —                                |
| 2753                   | Synthetic resins and rubber                          | 2,646               | 223                 | 1,804              | 619                       | n.p.                | n.p.             | 2,286                    | 2,428              | —                                      | 218              | —                                |
| 2754-2755              | Organic and inorganic industrial chemicals n.e.c.    | 22,046              | 2,626               | 13,460             | 5,960                     | n.p.                | n.p.             | 16,317                   | 19,476             | n.p.                                   | n.p.             | n.p.                             |
| 2762                   | Paints   | 7,016               | 1,184               | 4,501              | 1,331                     | 443                 | 1,802            | 4,770                    | 6,440              | n.p.                                   | n.p.             | —                                |
| 2763                   | Pharmaceutical and veterinary products               | 13,528              | 1,036               | 7,193              | 5,299                     | 1,336               | 5,787            | 6,405                    | 10,289             | n.p.                                   | 1,862            | n.p.                             |
| (c)                    | Other chemical, petroleum and coal products          | 7,878               | 856                 | 5,473              | 1,549                     | 123                 | 2,634            | 5,121                    | 7,193              | n.p.                                   | 521              | n.p.                             |
| 27                     | Total chemical, petroleum and coal products          | 53,114              | 5,924               | 32,432             | 14,758                    | 2,161               | 16,052           | 34,900                   | 45,826             | 508                                    | 4,766            | 2,014                            |
| 287                    | Cement and concrete products                         | 987                 | 146                 | 703                | 139                       | n.p.                | n.p.             | 804                      | 903                | —                                      | 85               | —                                |
| 285-286,288            | Glass, clay and other non-metallic mineral products  | 3,839               | 1,408               | 1,864              | 567                       | n.p.                | n.p.             | 1,706                    | 3,677              | —                                      | 162              | —                                |
| 28                     | Total non-metallic mineral products                  | 4,826               | 1,554               | 2,567              | 706                       | 171                 | 2,145            | 2,510                    | 4,579              | —                                      | 247              | —                                |
| 294                    | Basic iron and steel                                 | 22,954              | 2,400               | 16,213             | 4,341                     | 1,137               | 10,466           | 11,351                   | 19,434             | n.p.                                   | n.p.             | —                                |
| 295-296                | Basic non-ferrous metals                             | 4,405               | 707                 | 2,711              | 986                       | —                   | 1,888            | 2,517                    | 3,952              | —                                      | 453              | —                                |
| 29                     | Total basic metal products                           | 27,359              | 3,107               | 18,924             | 5,327                     | 1,137               | 12,354           | 13,869                   | 23,385             | n.p.                                   | n.p.             | —                                |

For footnotes see end of table.

**TABLE 4. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA, 1981-82**  
**DETAILS OF R & D EXPENDITURE BY INDUSTRY OF ENTERPRISE—continued**  
(\$' 000)

| Industry of enterprise |   | Type of expenditure |                     |                    |                           | Type of activity(a) |                  |                          | Source of funds(a) |  |                  |                                  |
|------------------------|---|---------------------|---------------------|--------------------|---------------------------|---------------------|------------------|--------------------------|--------------------|--|------------------|----------------------------------|
|                        |   | Total expenditure   | Capital expenditure | Wages and salaries | Other current expenditure | Basic research      | Applied research | Experimental development | Own funds          | Other private enterprises in Australia | Government funds | Other Australian and overseas(b) |
| ASIC code              | Description   |                     |                     |                    |                           |                     |                  |                          |                    |  |                  |                                  |
| 314                    | Structural metal products   | 1,512               | 623                 | 604                | 285                       | n.p.                | n.p.             | 1,438                    | 1,387              | —                                      | 125              | —                                |
| 315                    | Sheet metal products  | 2,039               | 329                 | 994                | 717                       | 40                  | 630              | 1,370                    | 1,920              | —                                      | 119              | —                                |
| 316                    | Other fabricated metal products   | 3,177               | 373                 | 2,149              | 655                       | n.p.                | n.p.             | 2,248                    | 2,781              | n.p.                                   | n.p.             | —                                |
| 31                     | Total fabricated metal products   | 6,729               | 1,324               | 3,747              | 1,657                     | 83                  | 1,590            | 5,056                    | 6,088              | n.p.                                   | n.p.             | —                                |
| 323                    | Motor vehicles and parts  | 29,725              | 2,455               | 18,446             | 8,824                     | 337                 | 757              | 28,630                   | 28,442             | n.p.                                   | n.p.             | —                                |
| 324                    | Other transport equipment   | 2,209               | 94                  | 1,841              | 274                       | —                   | 165              | 2,044                    | 823                | n.p.                                   | n.p.             | —                                |
| 32                     | Total transport equipment   | 31,933              | 2,549               | 20,287             | 9,098                     | 337                 | 922              | 30,674                   | 29,264             | 26                                     | 2,643            | —                                |
| 334                    | Photographic, professional and scientific equipment                       | 5,083               | 367                 | 3,021              | 1,695                     | 143                 | 1,557            | 3,383                    | 4,631              | —                                      | 452              | —                                |
| 3351-3352              | Radio and T.V. receivers; audio equipment and electronic equipment n.e.c. | 26,786              | 2,398               | 16,342             | 8,046                     | 869                 | 5,864            | 20,053                   | 19,904             | n.p.                                   | 4,124            | n.p.                             |
| 3353                   | Refrigerators and household appliances                                    | 4,489               | 428                 | 3,232              | 829                       | n.p.                | 925              | n.p.                     | 4,247              | n.p.                                   | n.p.             | —                                |
| 3354                   | Water heating systems   | 949                 | 31                  | 494                | 424                       | 12                  | 219              | n.p.                     | 845                | —                                      | 103              | —                                |
| 3355-3357              | Other electrical machinery and equipment                                  | 4,984               | n.p.                | 3,465              | n.p.                      | n.p.                | 1,359            | 3,454                    | 4,068              | n.p.                                   | n.p.             | —                                |
| 335                    | Total appliances and electrical equipment                                 | 37,208              | 3,388               | 23,515             | 10,306                    | 1,336               | 8,367            | 27,505                   | 29,065             | 2,552                                  | n.p.             | n.p.                             |
| 3361                   | Agricultural machinery  | 6,587               | n.p.                | 4,367              | n.p.                      | 258                 | 1,402            | 4,927                    | 6,388              | —                                      | 199              | —                                |
| 3362                   | Construction machinery  | 304                 | n.p.                | 147                | n.p.                      | —                   | n.p.             | n.p.                     | n.p.               | —                                      | n.p.             | —                                |
| 3363                   | Materials handling equipment  | 252                 | —                   | 195                | 57                        | n.p.                | n.p.             | 242                      | n.p.               | n.p.                                   | n.p.             | —                                |
| 3364-3369              | Other industrial machinery and equipment n.e.c.                           | 7,510               | 947                 | 4,419              | 2,144                     | 293                 | 1,293            | 5,923                    | 5,714              | n.p.                                   | 1,683            | n.p.                             |
| 336                    | Total industrial machinery and equipment                                  | 14,654              | 1,292               | 9,127              | 4,234                     | 553                 | 2,728            | 11,373                   | 12,571             | 152                                    | n.p.             | n.p.                             |
| 33                     | Total other machinery and equipment                                       | 56,945              | 5,047               | 34,663             | 16,235                    | 2,032               | 12,652           | 42,261                   | 46,267             | 2,704                                  | 7,744            | 258                              |
| 346                    | Rubber products   | 1,461               | 269                 | 825                | 367                       | n.p.                | n.p.             | 902                      | 1,279              | —                                      | 182              | —                                |
| 347                    | Plastic and related products  | 4,260               | 1,221               | 2,317              | 722                       | n.p.                | n.p.             | 3,427                    | 3,867              | —                                      | 393              | —                                |
| 345,348                | Leather, leather products and other manufacturing                         | 1,605               | 166                 | 839                | 600                       | n.p.                | n.p.             | 1,251                    | 1,519              | —                                      | 86               | —                                |
| 34                     | Total miscellaneous manufacturing   | 7,326               | 1,656               | 3,981              | 1,689                     | 80                  | 1,665            | 5,581                    | 6,665              | —                                      | 661              | —                                |
| C                      | Total manufacturing   | 209,116             | 24,438              | 130,270            | 54,408                    | 6,694               | 57,355           | 145,067                  | 180,539            | 4,895                                  | 21,410           | 2,272                            |
|                        | Other industries—   |                     |                     |                    |                           |                     |                  |                          |                    |  |                  |                                  |
| F                      | Construction  | 2,761               | 318                 | 1,336              | 1,107                     | n.p.                | n.p.             | 1,555                    | 2,372              | n.p.                                   | n.p.             | —                                |
| 47                     | Wholesale trade   | 11,499              | 873                 | 8,236              | 3,257                     | 1,381               | 2,780            | 7,338                    | 9,879              | 65                                     | 1,239            | 315                              |
| 48                     | Retail trade  | 413                 | 32                  | 274                | 107                       | 27                  | 98               | 288                      | 353                | —                                      | 60               | —                                |
| F                      | Total wholesale and retail trade  | 11,912              | 905                 | 8,510              | 3,364                     | 1,408               | 2,878            | 7,626                    | 10,232             | 65                                     | 1,299            | 315                              |
| 63                     | Property and business services  | 18,509              | 1,996               | 11,875             | 4,639                     | 616                 | 5,863            | 12,030                   | 11,044             | 2,694                                  | 2,398            | 2,372                            |
| 8461                   | Research and scientific institutions                                      | 21,770              | 2,476               | 12,160             | 7,134                     | n.p.                | n.p.             | 2,341                    | 4,985              | 10,066                                 | 4,945            | 1,773                            |
| (d)                    | Other n.e.c.  | 53,853              | 9,658               | 29,323             | 14,872                    | 3,999               | 25,797           | 24,058                   | 51,166             | n.p.                                   | 1,441            | n.p.                             |
| 16, D-L                | Total other industries  | 108,805             | 14,485              | 63,203             | 31,116                    | 11,992              | 49,204           | 47,609                   | 79,800             | 13,438                                 | n.p.             | n.p.                             |
|                        | Total all industries(e)   | 340,507             | 44,567              | 207,006            | 88,934                    | 19,044              | 115,012          | 206,451                  | 279,066            | 20,509                                 | 33,347           | 7,585                            |
|                        | Private business enterprise contribution to 'Total all industries'—       |                     |                     |                    |                           |                     |                  |                          |                    |  |                  |                                  |
|                        | 1981-82   | 285,686             | 35,336              | 177,259            | 73,093                    | 13,983              | 89,696           | 182,009                  | 228,195            | 19,960                                 | 29,951           | 7,580                            |
|                        | 1978-79   | 205,814             | 21,856              | 127,387            | 56,470                    | 7,667               | 61,721           | 136,428                  | 161,237            | 13,870                                 | 21,266           | 9,440                            |

(a) For further information see also Table 9. (b) Includes Higher Education Sector. (c) ASIC Classes 2751-2752, 2761, 2764-2780. (d) ASIC codes 16, D, G-H, 61-62, J, 8141-8306, 8462-9364. (e) Excludes ASIC Division A.

**TABLE 5. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA, 1981-82**  
**DETAILS OF R & D MANPOWER BY INDUSTRY OF ENTERPRISE**  
 (man-years)

| Industry of enterprise | ASIC code    | Description  | Manpower by type of employee |              |              |                         | Manpower by enterprise employment size(a) |             | Researcher effort by location(b) |      |      |      |                                |
|------------------------|--------------|--|------------------------------|--------------|--------------|-------------------------|---|-------------|----------------------------------|------|------|------|--------------------------------|
|                        |              |  | Total man-years              | Re-searchers | Tech-nicians | Other support-ing staff | Less than 200                             | 200 or more | N.S.W.                           | Vic. | Qld  | S.A. | Other Aus-tralian and overseas |
|                        |              | <b>Mining—</b>                                       |                              |              |              |                         |   |             |                                  |      |      |      |                                |
|                        | 11           | Metallic minerals                                    | 354                          | 150          | n.p.         | n.p.                    | 20  | 334         | n.p.                             | 12   | n.p. | n.p. | 52                             |
|                        | 12-15        | Non-metallic minerals                                | 27                           | 14           | n.p.         | n.p.                    | 7   | 20          | n.p.                             | 1    | n.p. | —    | —                              |
|                        | 11-15        | Total mining (excl. services to mining)              | 381                          | 163          | 111          | 106                     | 27  | 354         | 26                               | 13   | n.p. | n.p. | 52                             |
|                        |              | <b>Manufacturing—</b>                                |                              |              |              |                         |   |             |                                  |      |      |      |                                |
|                        | 211          | Meat products  | 11                           | 5            | 4            | 2                       | —   | 11          | n.p.                             | n.p. | —    | n.p. | —                              |
|                        | 212          | Milk products  | 96                           | 56           | 29           | 10                      | 9   | 87          | 3                                | 49   | 2    | n.p. | n.p.                           |
|                        | 213          | Fruit and vegetable products                         | 34                           | 26           | 6            | 2                       | 4   | 30          | n.p.                             | 19   | —    | 4    | n.p.                           |
|                        | 215-216      | Flour and cereal products, bread, cakes and biscuits | 75                           | 45           | 23           | 7                       | 25  | 50          | n.p.                             | 15   | n.p. | —    | —                              |
|                        | 214, 217     | Margarine, oils, fats and other food products        | 99                           | 66           | 19           | 14                      | 11  | 88          | 27                               | n.p. | n.p. | —    | n.p.                           |
|                        | 218-219      | Beverages, malt and tobacco products                 | 52                           | 24           | 20           | 8                       | 6   | 46          | n.p.                             | 16   | n.p. | n.p. | n.p.                           |
|                        | 21           | Total food, beverages and tobacco                    | 367                          | 221          | 101          | 44                      | 55  | 312         | 65                               | 133  | 12   | 9    | 3                              |
|                        | 234          | Textile fibres, yarns and woven fabrics              | 8                            | 3            | n.p.         | n.p.                    | 7   | 1           | n.p.                             | 2    | n.p. | —    | n.p.                           |
|                        | 235, 24      | Other textile products and clothing and footwear     | 16                           | 6            | n.p.         | n.p.                    | 9   | 8           | 4                                | 2    | —    | —    | —                              |
|                        | 23-24        | Total textiles, clothing and footwear                | 24                           | 9            | 9            | 6                       | 16  | 8           | n.p.                             | 4    | n.p. | —    | n.p.                           |
|                        | 25           | Wood, wood products and furniture                    | 43                           | 16           | 17           | 10                      | 19  | 24          | 10                               | 2    | 2    | n.p. | n.p.                           |
|                        | 263          | Paper and paper products                             | 122                          | n.p.         | n.p.         | n.p.                    | n.p.                                      | n.p.        | n.p.                             | n.p. | —    | n.p. | n.p.                           |
|                        | 264          | Printing and allied industries                       | 3                            | n.p.         | n.p.         | n.p.                    | 3   | —           | n.p.                             | n.p. | —    | n.p. | —                              |
|                        | 26           | Total paper, paper products, printing and publishing | 125                          | 59           | 53           | 14                      | n.p.                                      | n.p.        | 7                                | 28   | —    | n.p. | n.p.                           |
|                        | 2753         | Synthetic resins and rubber                          | 73                           | 44           | n.p.         | n.p.                    | 15  | 58          | 12                               | n.p. | n.p. | —    | —                              |
|                        | 2754-2755    | Organic and inorganic industrial chemicals n.e.c.    | 449                          | 248          | n.p.         | n.p.                    | 30  | 419         | 49                               | 187  | n.p. | n.p. | n.p.                           |
|                        | 2762         | Paints   | 200                          | 93           | 84           | 23                      | 38  | 162         | 47                               | n.p. | —    | n.p. | n.p.                           |
|                        | 2763         | Pharmaceutical and veterinary products               | 278                          | 125          | 97           | 55                      | 45  | 233         | 52                               | 65   | n.p. | n.p. | 4                              |
|                        | (c)          | Other chemical, petroleum and coal products          | 231                          | 148          | 55           | 28                      | 70  | 161         | 63                               | 41   | 33   | 8    | 4                              |
|                        | 27           | Total chemical, petroleum and coal products          | 1,231                        | 659          | 396          | 176                     | 198                                       | 1,033       | 222                              | 366  | 37   | 16   | 18                             |
|                        | 287          | Cement and concrete products                         | 32                           | 16           | 7            | 10                      | 6   | 26          | n.p.                             | n.p. | 2    | —    | n.p.                           |
|                        | 285-286, 288 | Glass, clay and other non-metallic mineral products  | 77                           | 33           | 27           | 17                      | 6   | 71          | 18                               | n.p. | n.p. | n.p. | n.p.                           |
|                        | 28           | Total non-metallic mineral products                  | 109                          | 49           | 34           | 27                      | 13  | 96          | n.p.                             | 21   | n.p. | n.p. | 2                              |
|                        | 294          | Basic iron and steel                                 | 577                          | 255          | 196          | 127                     | 10  | 568         | 182                              | n.p. | n.p. | n.p. | n.p.                           |
|                        | 295-296      | Basic non-ferrous metals                             | 96                           | 45           | 22           | 28                      | 6   | 90          | 8                                | n.p. | n.p. | n.p. | n.p.                           |
|                        | 29           | Total basic metal products                           | 673                          | 300          | 218          | 155                     | 15  | 658         | 190                              | 61   | 14   | n.p. | n.p.                           |

For footnotes see end of table.



**TABLE 5. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA, 1981-82**  
**DETAILS OF R & D MANPOWER BY INDUSTRY OF ENTERPRISE—continued**  
 (man-years)

| Industry of enterprise |   | Manpower by type of employee |              |              |                         | Manpower by enterprise employment size(a) |             | Researcher effort by location(b) |       |      |      |                               |
|------------------------|---|------------------------------|--------------|--------------|-------------------------|---|-------------|----------------------------------|-------|------|------|-------------------------------|
|                        |   | Total man-years              | Re-searchers | Tech-nicians | Other support-ing staff | Less than 200                             | 200 or more | N.S.W.                           | Vic.  | Qld  | S.A. | Other Australian and overseas |
| 314                    | Structural metal products   | 27                           | 14           | 10           | 3                       | n.p.                                      | n.p.        | 2                                | 6     | 3    | n.p. | n.p.                          |
| 315                    | Sheet metal products  | 37                           | 21           | 14           | 2                       | 21  | 16          | 9                                | 3     | n.p. | n.p. | n.p.                          |
| 316                    | Other fabricated metal products   | 96                           | 40           | 37           | 19                      | 39  | 57          | 12                               | 13    | n.p. | 9    | n.p.                          |
| 31                     | Total fabricated metal products   | 161                          | 75           | 60           | 25                      | n.p.                                      | n.p.        | 22                               | 22    | 8    | 19   | n.p.                          |
| 323                    | Motor vehicles and parts  | 853                          | 215          | 503          | 134                     | 46  | 807         | 26                               | n.p.  | n.p. | n.p. | n.p.                          |
| 324                    | Other transport equipment   | 50                           | 21           | 9            | 20                      | 15  | 35          | 14                               | n.p.  | n.p. | n.p. | n.p.                          |
| 32                     | Total transport equipment   | 903                          | 237          | 512          | 154                     | 61  | 842         | 40                               | 147   | 4    | 43   | n.p.                          |
| 334                    | Photographic, professional and scientific equipment                       | 160                          | 83           | 62           | 15                      | 40  | 120         | n.p.                             | 26    | 5    | n.p. | —                             |
| 3351-3352              | Radio and T.V. receivers; audio equipment and electronic equipment n.e.c. | 578                          | 196          | 324          | 58                      | 120                                       | 458         | 133                              | 33    | 5    | 14   | 11                            |
| 3353                   | Refrigerators and household appliances                                    | 141                          | 55           | 42           | 44                      | n.p.                                      | n.p.        | 20                               | n.p.  | n.p. | 8    | n.p.                          |
| 3354                   | Water heating systems   | 20                           | 8            | 8            | 3                       | n.p.                                      | n.p.        | n.p.                             | n.p.  | n.p. | n.p. | 3                             |
| 3355-3357              | Other electrical machinery and equipment                                  | 160                          | 65           | 60           | 35                      | 101                                       | 59          | 26                               | 33    | n.p. | 4    | n.p.                          |
| 335                    | Total appliances and electrical equipment                                 | 899                          | 324          | 434          | 141                     | 255                                       | 644         | n.p.                             | 86    | 14   | n.p. | 18                            |
| 3361                   | Agricultural machinery  | 205                          | 65           | 87           | 53                      | 33  | 172         | n.p.                             | 23    | 6    | n.p. | n.p.                          |
| 3362                   | Construction machinery  | 6                            | 1            | 4            | 1                       | 6   | —           | n.p.                             | —     | —    | n.p. | n.p.                          |
| 3363                   | Materials handling equipment  | 10                           | 5            | 4            | 1                       | 10  | —           | 3                                | —     | —    | —    | 2                             |
| 3364-3369              | Other industrial machinery and equipment n.e.c.                           | 193                          | 84           | 65           | 44                      | 156                                       | 38          | 45                               | 23    | 5    | 5    | 6                             |
| 336                    | Total industrial machinery and equipment                                  | 414                          | 155          | 159          | 99                      | 204                                       | 209         | 49                               | 46    | 12   | 27   | 22                            |
| 33                     | Total other machinery and equipment                                       | 1,472                        | 562          | 655          | 255                     | 499                                       | 973         | 266                              | 158   | 31   | 213  | 40                            |
| 346                    | Rubber products   | 37                           | 22           | 12           | 4                       | n.p.                                      | n.p.        | n.p.                             | 13    | n.p. | n.p. | —                             |
| 347                    | Plastic and related products  | 102                          | 48           | 40           | 15                      | 37  | 65          | 13                               | 26    | n.p. | 5    | n.p.                          |
| 345, 348               | Leather, leather products and other manufacturing                         | 40                           | 24           | 10           | 6                       | n.p.                                      | n.p.        | n.p.                             | 5     | 9    | n.p. | n.p.                          |
| 34                     | Total miscellaneous manufacturing   | 180                          | 93           | 62           | 25                      | 83  | 96          | 19                               | 45    | 14   | 14   | 2                             |
| C                      | Total manufacturing   | 5,287                        | 2,280        | 2,117        | 891                     | 1,041                                     | 4,246       | 863                              | 986   | 128  | 194  | 109                           |
|                        | Other industries—   |                              |              |              |                         |   |             |                                  |       |      |      |                               |
| E                      | Construction  | 51                           | 34           | 10           | 7                       | 19  | 32          | 11                               | 18    | n.p. | n.p. | n.p.                          |
| 47                     | Wholesale trade   | 277                          | 151          | 76           | 50                      | n.p.                                      | n.p.        | 41                               | n.p.  | n.p. | n.p. | 12                            |
| 48                     | Retail trade  | 13                           | 8            | 4            | 2                       | n.p.                                      | n.p.        | 4                                | n.p.  | n.p. | n.p. | —                             |
| F                      | Total wholesale and retail trade  | 290                          | 159          | 80           | 52                      | 140                                       | 151         | 45                               | 63    | 25   | 13   | 12                            |
| 63                     | Property and business services  | 466                          | 235          | 142          | 89                      | 333                                       | 132         | 119                              | 37    | 15   | 8    | 55                            |
| 8461                   | Research and scientific institutions                                      | 464                          | 192          | 128          | 144                     | 230                                       | 234         | 119                              | 5     | n.p. | n.p. | n.p.                          |
| (d)                    | Other n.e.c.  | 983                          | 409          | 340          | 235                     | 103                                       | 880         | 65                               | 296   | 12   | 17   | 19                            |
| 16, D-L                | Total other industries  | 2,255                        | 1,029        | 700          | 526                     | 827                                       | 1,428       | 360                              | 419   | 108  | 53   | 88                            |
|                        | Total all industries(e)   | 7,923                        | 3,472        | 2,928        | 1,523                   | 1,895                                     | 6,028       | 1,249                            | 1,418 | 304  | 252  | 249                           |
|                        | Private business enterprise contribution to 'Total all industries'—       |                              |              |              |                         |   |             |                                  |       |      |      |                               |
|                        | 1981-82   | 6,913                        | 3,053        | 2,565        | 1,295                   | n.a.                                      | n.a.        | 1,206                            | 1,087 | 287  | 234  | 240                           |
|                        | 1978-79   | 7,546                        | 3,186        | 2,729        | 1,630                   | n.a.                                      | n.a.        | 1,233                            | 1,266 | 318  | 227  | 142                           |

(a) For further information see also Table 10. (b) For further information see also Table 11. (c) ASIC Classes 2751-2752, 2761, 2764-2780. (d) ASIC codes 16, D, G-H, 61-62, J, 8141-8306, 8462-9364. (e) Excludes ASIC Division A.

TABLE 6. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA, 1981-82  
R & D EXPENDITURE OF MINING AND MANUFACTURING ENTERPRISES(a) BY INDUSTRY OF ENTERPRISE BY BROAD ENTERPRISE TURNOVER SIZE(b)  
(\$' 000)

| Industry of enterprise |   | Enterprise turnover size (\$m) |          |           |              | Total   |
|------------------------|---|--------------------------------|----------|-----------|--------------|---------|
| ASIC code              | Description   | Less than 5.0                  | 5.0-19.9 | 20.0-49.9 | 50.0 or more |         |
| 11-15                  | Mining (excl. services to mining)   | n.a.                           | n.a.     | 539       | 8,672        | 9,732   |
|                        | <b>Manufacturing—</b>   |                                |          |           |              |         |
| 21                     | Food, beverages and tobacco   | 377                            | 1,690    | 2,356     | 8,701        | 13,124  |
| 23-24                  | Textiles, clothing and footwear   | 284                            | 349      | 130       | 22           | 785     |
| 25                     | Wood, wood products and furniture   | n.p.                           | n.p.     | 463       | 493          | 1,719   |
| 26                     | Paper, paper products, printing and publishing  | n.p.                           | n.p.     | 345       | 4,808        | 5,255   |
| 2763                   | Pharmaceuticals and veterinary products   | 1,282                          | 1,413    | 8,736     | 2,097        | 13,528  |
| (c)                    | Chemicals, petroleum and coal products  | 1,934                          | 3,602    | 4,910     | 29,140       | 39,586  |
| 28                     | Non-metallic mineral products   | 435                            | 98       | 624       | 3,670        | 4,826   |
| 29                     | Basic metal products  | 79                             | 571      | 518       | 26,191       | 27,359  |
| 31                     | Fabricated metal products   | 2,213                          | 949      | 961       | 2,605        | 6,729   |
| 32                     | Transport equipment   | 1,351                          | 957      | 1,278     | 28,348       | 31,933  |
| 334-335                | Photographic, professional and scientific equipment and appliances and electrical equipment | 7,843                          | 7,832    | 3,910     | 22,707       | 42,291  |
| 336                    | Industrial machinery and equipment  | 6,552                          | 1,750    | 1,980     | 4,372        | 14,654  |
| 33                     | Total other machinery and equipment   | 14,395                         | 9,582    | 5,890     | 27,079       | 56,945  |
| 34                     | Miscellaneous manufacturing   | 3,470                          | 906      | 1,273     | 1,676        | 7,326   |
| C                      | Total manufacturing   | 26,578                         | 20,225   | 27,484    | 134,829      | 209,116 |

(a) Excludes ASIC Subdivision 16. (b) For further information see also Table 7. (c) ASIC Subdivision 27 excluding ASIC Class 2763.

**TABLE 7. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA, 1981-82**  
**R & D EXPENDITURE OF MINING AND MANUFACTURING ENTERPRISES(a) BY DETAILED ENTERPRISE TURNOVER SIZE(b)**  
(\$' 000)

| Enterprise turnover size (\$m) | Less than 1.0 | 1.0-4.9 | 5.0-9.9 | 10.0-19.9 | 20.0-29.9 | 30.0-39.9 | 40.0-49.9 | 50.0-74.9 | 75.0-99.9 | 100.0-149.9 | 150.0-199.9 | 200.0 or more | Total   |
|--------------------------------|---------------|---------|---------|-----------|-----------|-----------|-----------|-----------|-----------|-------------|-------------|---------------|---------|
|                                | 13,849        | 13,059  | 6,678   | 17,456    | 10,208    | 6,155     | 11,187    | 10,789    | 10,090    | 19,980      | 7,711       | 104,539       | 231,702 |

(a) Excludes ASIC Subdivision 16. (b) For further information see also Table 6.

**TABLE 8. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA, 1981-82**  
**R & D EXPENDITURE OF MINING AND MANUFACTURING ENTERPRISES(a) BY DETAILED ENTERPRISE VALUE ADDED SIZE**  
(\$' 000)

| Enterprise value added size (\$m) | Less than 1.0 | 1.0-1.9 | 2.0-4.9 | 5.0-9.9 | 10.0-19.9 | 20.0-29.9 | 30.0-39.9 | 40.0-49.9 | 50.0-74.9 | 75.0-99.9 | 100.0 or more | Total   |
|-----------------------------------|---------------|---------|---------|---------|-----------|-----------|-----------|-----------|-----------|-----------|---------------|---------|
|                                   | 21,754        | 6,127   | 10,277  | 14,234  | 19,946    | 16,765    | 7,847     | 12,536    | 17,049    | 11,710    | 93,456        | 231,702 |

(a) Excludes ASIC Subdivision 16.

**TABLE 9. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA, 1981-82**  
**R & D EXPENDITURE BY INDUSTRY OF ENTERPRISE BY SOURCE OF FUNDS AND BY TYPE OF R & D ACTIVITY**  
(\$' 000)

| Industry of enterprise |   | Source of funds(a) |                |                   |                               |                            |                            |   | Type of activity(a) |                     |                          |                  | Experimental development |
|------------------------|---|--------------------|----------------|-------------------|-------------------------------|----------------------------|----------------------------|---|---------------------|---------------------|--------------------------|------------------|--------------------------|
|                        |   | Total expenditure  | Own funds      | AIRDIB (b) grants | Other Commonwealth Government | State and local government | Other business enterprises | Private non-profit and other Australian (c) | Over-seas           | Pure basic research | Strategic basic research | Applied research |                          |
| ASIC code              | Description   |                    |                |                   |                               |                            |                            |   |                     |                     |                          |                  |                          |
| C                      | Manufacturing   | 209,116            | 180,539        | 13,033            | 8,270                         | 107                        | 4,895                      | n.p.  | n.p.                | 1,905               | 4,789                    | 57,355           | 145,067                  |
| B, D-L                 | Mining and other industries   | 131,390            | 98,526         | 5,286             | 6,256                         | 395                        | 15,614                     | n.p.  | n.p.                | 2,717               | 9,632                    | 57,656           | 61,384                   |
|                        | <b>Total all industries(d)</b>                                      | <b>340,507</b>     | <b>279,066</b> | <b>18,319</b>     | <b>14,526</b>                 | <b>502</b>                 | <b>20,509</b>              | <b>1,199</b>                                | <b>6,386</b>        | <b>4,622</b>        | <b>14,422</b>            | <b>115,012</b>   | <b>206,451</b>           |
|                        | Private business enterprise contribution to 'Total all industries'— |                    |                |                   |                               |                            |                            |   |                     |                     |                          |                  |                          |
|                        | 1981-82   | 285,686            | 228,196        | 18,183            | 11,368                        | 400                        | 19,961                     | 1,194                                       | 6,386               | 4,354               | 9,629                    | 89,696           | 182,009                  |
|                        | 1978-79   | 205,814            | 161,237        | 12,953            | 7,513                         | 774                        | 13,870                     | 851   | 8,616               | 3,443               | 4,224                    | 61,721           | 136,428                  |

(a) For further information see also Table 4. (b) Australian Industrial Research and Development Incentives Board. (c) Includes Higher Education Sector. (d) Excludes ASIC Division A.

**TABLE 10. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA, 1981-82**  
**R & D MANPOWER BY INDUSTRY OF ENTERPRISE BY DETAILED ENTERPRISE EMPLOYMENT SIZE(a)**  
 (man-years)

| <i>Industry of enterprise</i> |                                | <i>Enterprise employment size (persons)</i> |              |              |              |                |                |                |                    |                    |                    |                       | <i>Total</i> |
|-------------------------------|--------------------------------|---|--------------|--------------|--------------|----------------|----------------|----------------|--------------------|--------------------|--------------------|-----------------------|--------------|
|                               |                                | <i>Less than 10</i>                         | <i>10-19</i> | <i>20-49</i> | <i>50-99</i> | <i>100-199</i> | <i>200-499</i> | <i>500-999</i> | <i>1,000-1,999</i> | <i>2,000-4,999</i> | <i>5,000-9,999</i> | <i>10,000 or more</i> |              |
| <i>ASIC code</i>              | <i>Description</i>             |   |              |              |              |                |                |                |                    |                    |                    |                       |              |
| C                             | Manufacturing                  | 136   | 201          | 234          | 275          | 196            | 623            | 609            | 580                | 1,018              | 486                | 930                   | 5,287        |
| B, D-I.                       | Mining and other industries    | 269   | 94           | 151          | 290          | 50             | 343            | 81             | 68                 | 267                | 327                | 696                   | 2,636        |
|                               | <b>Total all industries(b)</b> | <b>405</b>                                  | <b>295</b>   | <b>385</b>   | <b>565</b>   | <b>246</b>     | <b>966</b>     | <b>690</b>     | <b>648</b>         | <b>1,285</b>       | <b>813</b>         | <b>1,626</b>          | <b>7,923</b> |

(a) For further information see also Table 5. (b) Excludes ASIC Division A.

**TABLE 11. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES, AUSTRALIA, 1981-82**  
**RESEARCHER EFFORT BY INDUSTRY OF ENTERPRISE BY STATE(a)**  
 (man-years)

| <i>Industry of enterprise</i> |                                | <i>State</i>  |              |            |             |             |             |             |               |                 | <i>Total</i> |
|-------------------------------|--------------------------------|---------------|--------------|------------|-------------|-------------|-------------|-------------|---------------|-----------------|--------------|
|                               |                                | <i>N.S.W.</i> | <i>Vic.</i>  | <i>Qld</i> | <i>S.A.</i> | <i>W.A.</i> | <i>Tas.</i> | <i>N.T.</i> | <i>A.C.T.</i> | <i>Overseas</i> |              |
| <i>ASIC code</i>              | <i>Description</i>             |               |              |            |             |             |             |             |               |                 |              |
| C                             | Manufacturing                  | 863           | 986          | 128        | 194         | 46          | 47          | —           | 7             | 10              | 2,280        |
| B, D-I.                       | Mining and other industries    | 387           | 432          | 176        | 57          | 93          | 40          | n.p.        | n.p.          | 2               | 1,192        |
|                               | <b>Total all industries(b)</b> | <b>1,249</b>  | <b>1,418</b> | <b>304</b> | <b>252</b>  | <b>139</b>  | <b>87</b>   | <b>n.p.</b> | <b>n.p.</b>   | <b>12</b>       | <b>3,472</b> |

(a) For further information see also Table 5. (b) Excludes ASIC Division A.

**TABLE 12. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES,  
AUSTRALIA, 1978-79 AND 1981-82  
R & D EXPENDITURE BY INDUSTRY OF PRODUCT FIELD(a)**

| <i>Industry of product field</i>                   |   | <i>1978-79</i>        |                              | <i>1981-82</i>        |                              |
|--|---|-----------------------|------------------------------|-----------------------|------------------------------|
| <i>ASIC code</i>                                   | <i>Description</i>  | <i>Enterprises(b)</i> | <i>R &amp; D expenditure</i> | <i>Enterprises(b)</i> | <i>R &amp; D expenditure</i> |
|  |   | <i>number</i>         | <i>\$' 000</i>               | <i>number</i>         | <i>\$' 000</i>               |
| <b>Agriculture, forestry, fishing and hunting—</b> |   |                       |                              |                       |                              |
| 012,018  | Sheep, grain, cattle, pigs and poultry                      | 8                     | 755                          | 4                     | 552                          |
| 013-014,019-04                                     | Other agriculture, forestry, fishing and hunting            | 15                    | 1,623                        | 8                     | 766                          |
| A  | <i>Total agriculture, forestry, fishing and hunting</i>     | 23                    | 2,378                        | 12                    | 1,317                        |
| <b>Mining—</b>                                     |   |                       |                              |                       |                              |
| 11   | Metallic minerals   | 14                    | 5,201                        | 17                    | 16,311                       |
| 12-15  | Non-metallic minerals                                       | 24                    | 6,849                        | 18                    | 18,690                       |
| 11-15  | <i>Total mining (excl. services to mining)</i>              | 36                    | 12,050                       | 34                    | 35,002                       |
| <b>Manufacturing—</b>                              |   |                       |                              |                       |                              |
| 211  | Meat products   | 15                    | 1,070                        | 8                     | 533                          |
| 212  | Milk products   | 15                    | 1,497                        | 18                    | 2,382                        |
| 213  | Fruit and vegetable products                                | 18                    | 1,287                        | 16                    | 1,254                        |
| 215-216  | Flour and cereal products, bread, cakes and biscuits        | 20                    | 3,042                        | 22                    | 4,612                        |
| 214,217  | Margarines, oils, fats and other food products              | 61                    | 8,546                        | 40                    | 5,478                        |
| 218-219  | Beverages, malt and tobacco products                        | 21                    | 2,035                        | 16                    | 2,053                        |
| 21   | <i>Total food, beverages and tobacco</i>                    | 109                   | 17,477                       | 90                    | 16,311                       |
| 234  | Textile fibres, yarns and woven fabrics                     | 12                    | 1,039                        | n.p.                  | n.p.                         |
| 235,24   | Other textile products, clothing and footwear               | 16                    | 778                          | n.p.                  | n.p.                         |
| 23-24  | <i>Total textiles, clothing and footwear</i>                | 27                    | 1,817                        | 16                    | 1,064                        |
| 25   | Wood, wood products and furniture                           | 35                    | 1,866                        | 30                    | 2,609                        |
| 263  | Paper and paper products                                    | 15                    | 2,750                        | n.p.                  | n.p.                         |
| 264  | Printing and allied industries                              | 9                     | 1,190                        | n.p.                  | n.p.                         |
| 26   | <i>Total paper, paper products, printing and publishing</i> | 24                    | 3,940                        | 11                    | 5,520                        |
| 2751   | Chemical fertilizers  | 6                     | 981                          | 12                    | 1,813                        |
| 2753   | Synthetic resins and rubber                                 | 27                    | 4,674                        | 24                    | 8,910                        |
| 2754   | Organic industrial chemicals n.e.c.                         | 31                    | 3,874                        | 21                    | 2,284                        |
| 2755   | Inorganic industrial chemicals n.e.c.                       | 21                    | 3,779                        | 28                    | 6,131                        |
| 2762   | Paints  | 32                    | 4,534                        | 29                    | 6,613                        |
| 2763   | Veterinary products   | 17                    | 5,941                        | 24                    | 4,175                        |
| 2764   | Pharmaceutical products                                     | 28                    | 7,361                        | 23                    | 9,698                        |
| 2764   | Pesticides  | 19                    | 4,626                        | 16                    | 6,229                        |
| 2765   | Soap and other detergents                                   | 28                    | 1,667                        | 25                    | 2,265                        |
| 2766   | Cosmetics and toilet preparations                           | 14                    | 817                          | 9                     | 434                          |
| 2767   | Inks  | 5                     | 726                          | 7                     | 734                          |
| 2752,2761,2768                                     | Industrial gases, ammunition and other chemical products    | 39                    | 2,843                        | 39                    | 5,087                        |
| 275-276  | <i>Total basic chemicals and other chemical products</i>    | 212                   | 41,823                       | 186                   | 54,374                       |
| 277-278  | Petroleum refining, petroleum and coal products n.e.c.      | 22                    | 2,904                        | 25                    | 5,832                        |
| 27   | <i>Total chemicals, petroleum and coal products</i>         | 220                   | 44,727                       | 195                   | 60,207                       |
| 285  | Glass and glass products                                    | 9                     | 937                          | 4                     | 257                          |
| 286  | Clay products and refractories                              | 15                    | 781                          | 19                    | 2,438                        |
| 287  | Cement and concrete products                                | 16                    | 1,325                        | 23                    | 1,820                        |
| 288  | Other non-metallic mineral products                         | 15                    | 1,952                        | 12                    | 1,628                        |
| 28   | <i>Total non-metallic mineral products</i>                  | 49                    | 4,995                        | 52                    | 6,142                        |
| 294  | Basic iron and steel  | 43                    | 8,798                        | 29                    | 13,579                       |
| 295-296  | Basic non-ferrous metals                                    | 29                    | 4,409                        | 36                    | 10,610                       |
| 29   | <i>Total basic metal products</i>                           | 71                    | 13,207                       | 63                    | 24,189                       |

For footnotes see end of table.

**TABLE 12. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES,  
AUSTRALIA, 1978-79 AND 1981-82  
R & D EXPENDITURE BY INDUSTRY OF PRODUCT FIELD(a)—continued**

| Industry of product field      |   | 1978-79        |                   | 1981-82        |                   |
|--------------------------------|---|----------------|-------------------|----------------|-------------------|
| ASIC code                      | Description   | Enterprises(b) | R & D expenditure | Enterprises(b) | R & D expenditure |
|                                |   | number         | \$' 000           | number         | \$' 000           |
| 314                            | Structural metal products                                       | 37             | 2,337             | 32             | 2,933             |
| 315                            | Sheet metal products  | 21             | 717               | 27             | 964               |
| 316                            | Other fabricated metal products                                 | 84             | 4,675             | 54             | 3,342             |
| 31                             | Total fabricated metal products                                 | 126            | 7,729             | 105            | 7,238             |
| 323                            | Motor vehicles and parts  | 69             | 17,411            | 70             | 32,717            |
| 3241-3242                      | Ships and boats   | 9              | 256               | 18             | 534               |
| 3243                           | Railway rolling stock and locomotives                           | 6              | 1,249             | 8              | 1,478             |
| 3244                           | Aircraft  | 3              | 216               | n.p.           | n.p.              |
| 3245                           | Transport equipment n.e.c.                                      | 8              | 205               | n.p.           | n.p.              |
| 324                            | Total other transport equipment                                 | 26             | 1,927             | 36             | 3,704             |
| 32                             | Total transport equipment                                       | 93             | 19,337            | 103            | 36,422            |
| 334                            | Photographic, professional and scientific equipment             | 64             | 9,102             | 79             | 11,439            |
| 3351                           | Radio and T.V. receivers: audio equipment                       | 12             | 1,513             | 11             | 665               |
| 3352 {                         | Automatic data processing equipment                             | 41             | 5,214             | 62             | 7,852             |
|                                | Telecommunications and broadcasting equipment                   | 37             | 41,136            | 36             | 55,114            |
|                                | Other electronic equipment                                      | 58             | 3,124             | 84             | 8,099             |
| 3353                           | Refrigerators and household appliances                          | 48             | 4,646             | 35             | 3,858             |
| 3354                           | Water heating systems   | 31             | 1,867             | 27             | 2,304             |
| 3355-3357                      | Cables, batteries, and other electrical machinery and equipment | 78             | 6,582             | 90             | 8,250             |
| 335                            | Total appliances and electrical equipment                       | 254            | 64,082            | 306            | 86,143            |
| 3361                           | Agricultural machinery  | 44             | 4,998             | 66             | 6,322             |
| 3362                           | Construction machinery  | 18             | 958               | 18             | 848               |
| 3363                           | Materials handling equipment                                    | 44             | 2,312             | 31             | 1,483             |
| 3364                           | Wood and metal machinery  | 30             | 1,568             | 29             | 2,549             |
| 3365                           | Pumps and compressors   | 30             | 1,638             | 23             | 1,512             |
| 3366                           | Commercial space heating and cooling equipment                  | 21             | 582               | 8              | 396               |
| 3367                           | Dies, blades and machine tool accessories                       | 7              | 127               | 5              | 64                |
| 3368                           | Food processing machinery                                       | 21             | 818               | 19             | 1,417             |
| 3369                           | Industrial machinery and equipment n.e.c.                       | 175            | 9,008             | 169            | 12,081            |
| 336                            | Total industrial machinery and equipment                        | 327            | 22,009            | 323            | 26,672            |
| 33                             | Total other machinery and equipment                             | 571            | 495,193           | 640            | 124,254           |
| 345                            | Leather and leather products                                    | 7              | 105               | 7              | 165               |
| 346                            | Rubber products   | 18             | 1,679             | 15             | 901               |
| 347                            | Plastic and related products                                    | 59             | 3,148             | 74             | 4,389             |
| 348                            | Other manufacturing   | 18             | 2,453             | 21             | 1,207             |
| 34                             | Total miscellaneous manufacturing                               | 99             | 7,384             | 109            | 6,661             |
| C                              | Total manufacturing   | 1,097          | 217,672           | 1,169          | 290,617           |
| <b>Other industries—</b>       |   |                |                   |                |                   |
| 16                             | Services to mining n.e.c.                                       | 13             | 4,184             | 12             | 1,516             |
| E                              | Construction  | 20             | 709               | 12             | 357               |
| D, F-L                         | Other n.e.c.  | 73             | 8,847             | 50             | 11,697            |
| 16, D-L                        | Total other industries  | 94             | 13,740            | 73             | 13,570            |
| <b>Total all industries(c)</b> |   | <b>1,186</b>   | <b>245,841</b>    | <b>1,246</b>   | <b>340,507</b>    |

(a) The industry of product (or process) field towards which the R & D activity was directed. For further explanation see paragraph 33 in the Explanatory notes. (b) Where the R & D performed by an enterprise was directed to more than one product, that enterprise is counted in each of the industries to which its products are keyed. Therefore, the enterprise counts shown in this table can not be summed to aggregates for combinations of industries. (c) ASIC Divisions A-L.

TABLE 13. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES,  
AUSTRALIA, 1981-82  
R & D EXPENDITURE BY INDUSTRY OF PRODUCT FIELD(a) BY STATE  
(\$' 000)

| Industry of product field |   | State          |                |               |               |               |                             |                |
|---------------------------|---|----------------|----------------|---------------|---------------|---------------|-----------------------------|----------------|
| ASIC code                 | Description   | N.S.W.         | Vic.           | Qld           | S.A.          | W.A.          | Tas.,<br>N.T. and<br>A.C.T. | Total          |
| 11-15                     | Mining (excl. services to mining)                   | 13,849         | 2,352          | 13,360        | 2,550         | n.p.          | n.p.                        | 35,002         |
|                           | <b>Manufacturing—</b>                               |                |                |               |               |               |                             |                |
| 21                        | Food, beverages and tobacco                         | 4,815          | 6,261          | 3,621         | 1,158         | 284           | 172                         | 16,311         |
| 23-24                     | Textiles, clothing and footwear                     | 297            | 602            | —             | n.p.          | —             | n.p.                        | 1,064          |
| 25                        | Wood, wood products and furniture                   | n.p.           | 1,012          | 315           | 76            | n.p.          | n.p.                        | 2,609          |
| 26                        | Paper, paper products, printing and publishing      | n.p.           | 3,799          | —             | n.p.          | n.p.          | n.p.                        | 5,520          |
| 2763                      | Pharmaceutical and veterinary products              | 6,017          | 7,282          | 3,661         | 1,347         | 627           | 1,149                       | 13,873         |
| (b)                       | Chemicals, petroleum and coal products              | 11,673         | 28,452         |               |               |               |                             |                |
| 28                        | Non-metallic mineral products                       | 3,991          | 1,322          | 331           | 186           | n.p.          | n.p.                        | 6,142          |
| 29                        | Basic metal products                                | 10,801         | 5,474          | 1,050         | 1,917         | 827           | 4,121                       | 24,189         |
| 31                        | Fabricated metal products                           | 4,598          | 1,714          | 267           | 489           | n.p.          | n.p.                        | 7,238          |
| 32                        | Transport equipment                                 | 3,917          | 25,347         | 464           | 3,965         | 2,705         | 24                          | 36,422         |
| 334                       | Photographic, professional and scientific equipment | 4,204          | 4,392          | 484           | 2,132         | 94            | 133                         | 11,439         |
| 335                       | Appliances and electrical equipment                 | 24,679         | 55,289         | 770           | 2,970         | 1,962         | 474                         | 86,143         |
| 336                       | Industrial machinery and equipment                  | 8,117          | 8,313          | 3,901         | 2,492         | 3,529         | 320                         | 26,672         |
| 33                        | Total other machinery and equipment                 | 37,000         | 67,994         | 5,155         | 7,594         | 5,585         | 927                         | 124,254        |
| 34                        | Miscellaneous manufacturing                         | 2,202          | 2,543          | 879           | 692           | n.p.          | n.p.                        | 6,661          |
| C                         | Total manufacturing                                 | 86,362         | 151,802        | 15,743        | 17,550        | 10,692        | 8,468                       | 290,617        |
| A, 16, D-L                | Agriculture and other industries                    | 6,351          | 6,496          | 544           | 74            | n.p.          | n.p.                        | 14,888         |
|                           | <b>Total all industries(c) 1981-82</b>              | <b>106,560</b> | <b>160,650</b> | <b>29,647</b> | <b>20,172</b> | <b>14,515</b> | <b>8,962</b>                | <b>340,507</b> |
|                           | <b>Total all industries 1978-79</b>                 | <b>90,624</b>  | <b>106,242</b> | <b>20,690</b> | <b>15,527</b> | <b>5,887</b>  | <b>6,871</b>                | <b>245,841</b> |

(a) The industry of product (or process) field towards which the R & D activity was directed. For further explanation see paragraph 33 in the Explanatory notes.  
(b) ASIC Subdivision 27 excluding ASIC Class 2763. (c) ASIC Divisions A-L.

**TABLE 14. EXTRAMURAL R & D EXPENDITURE : EXPENDITURE BY BUSINESS ENTERPRISES  
ON R & D CARRIED OUT BY OTHERS-AUSTRALIA, 1981-82  
PAYMENTS BY INDUSTRY OF ENTERPRISE MAKING PAYMENT BY LOCATION OF RECIPIENT**

| Industry of enterprise making payment |   | Location of recipient |               |                  |               |                  |               |
|---------------------------------------|---|-----------------------|---------------|------------------|---------------|------------------|---------------|
|                                       |   | Australia             |               | Overseas         |               | Total            |               |
|                                       |   | Enter-<br>prises      | Pay-<br>ments | Enter-<br>prises | Pay-<br>ments | Enter-<br>prises | Pay-<br>ments |
| ASIC code                             | Description   | number                | \$' 000       | number           | \$' 000       | number           | \$' 000       |
| 11-15                                 | Mining (excl. services to mining)   | n.p.                  | n.p.          | n.p.             | n.p.          | 17               | 5,465         |
|                                       | <b>Manufacturing—</b>   |                       |               |                  |               |                  |               |
| 21                                    | Food, beverages and tobacco   | 17                    | 1,512         | —                | —             | 17               | 1,512         |
| 23-24                                 | Textiles, clothing and footwear   | n.p.                  | n.p.          | n.p.             | n.p.          | 5                | 254           |
| 25                                    | Wood, wood products and furniture   | 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.          |
| 2763                                  | Pharmaceutical and veterinary products  | 15                    | 1,138         | 4                | 162           | 15               | 1,300         |
| (a)                                   | Chemicals, petroleum and coal products  | 21                    | 4,022         | 4                | 402           | 25               | 4,424         |
| 28                                    | Non-metallic mineral products   | 6                     | 224           | —                | —             | 6                | 224           |
| 29                                    | Basic metal products  | 9                     | 801           | 3                | 135           | 11               | 936           |
| 31                                    | Fabricated metal products   | 15                    | 435           | —                | —             | 15               | 435           |
| 32                                    | Transport equipment   | n.p.                  | n.p.          | n.p.             | n.p.          | 11               | 269           |
| 334-335                               | Photographic, professional and scientific equipment and appliances and electrical equipment | 28                    | 1,199         | 5                | 327           | 31               | 1,526         |
| 336                                   | Industrial machinery and equipment  | 14                    | 223           | 4                | 241           | 17               | 464           |
| 33                                    | Total other machinery and equipment   | 42                    | 1,422         | 9                | 568           | 48               | 1,990         |
| 34                                    | Miscellaneous manufacturing   | n.p.                  | n.p.          | n.p.             | n.p.          | 16               | 1,323         |
| C                                     | Total manufacturing   | n.p.                  | n.p.          | n.p.             | n.p.          | 176              | 12,800        |
|                                       | <b>Other industries—</b>  |                       |               |                  |               |                  |               |
| F                                     | Wholesale and retail trade  | n.p.                  | n.p.          | n.p.             | n.p.          | 32               | 7,154         |
| 63                                    | Property and business services  | n.p.                  | n.p.          | n.p.             | n.p.          | 34               | 2,152         |
| (b)                                   | Other n.e.c.  | 39                    | 5,399         | 9                | 6,467         | 41               | 11,865        |
| 16, D-L                               | Total other industries  | 102                   | 11,484        | 12               | 9,686         | 107              | 21,170        |
|                                       | <b>Total all industries(c)</b>  | 279                   | 26,279        | 40               | 13,157        | 300              | 39,436        |
|                                       | Private business enterprise contribution to 'Total all industries' —                        |                       |               |                  |               |                  |               |
|                                       | 1981-82   | 245                   | 19,326        | 37               | 12,697        | 265              | 32,023        |
|                                       | 1978-79   | 234                   | 12,676        | 36               | 4,286         | 247              | 16,962        |

(a) ASIC Subdivision 27 excluding ASIC Class 2763. (b) ASIC codes 16, D-E, G-H, 61-62, J-L. (c) Excludes ASIC Division A.

**TABLE 15. EXTRAMURAL R & D EXPENDITURE : EXPENDITURE BY BUSINESS ENTERPRISES ON R & D  
CARRIED OUT BY OTHERS-AUSTRALIA, 1981-82  
PAYMENTS BY COUNTRY OF RECIPIENT BY RELATIONSHIP OF RECIPIENT TO ENTERPRISE MAKING PAYMENT  
(\$' 000)**

| Country of recipient |   | Industry of enterprise making payment |                                |                         |
|----------------------|---|---------------------------------------|--------------------------------|-------------------------|
|                      |   | Manufacturing(a)                      | Mining and other industries(b) | Total all industries(c) |
| U.K.                 | Related enterprises   | n.p.                                  | n.p.                           | 198                     |
|                      | Unrelated organisations   | 897                                   | —                              | 897                     |
|                      | Total   | n.p.                                  | n.p.                           | 1,095                   |
| U.S.A.               | Related enterprises   | n.p.                                  | n.p.                           | 3,851                   |
|                      | Unrelated organisations   | n.p.                                  | n.p.                           | 4,082                   |
|                      | Total   | 885                                   | 7,048                          | 7,933                   |
| Other overseas       | Related enterprises   | 206                                   | 220                            | 426                     |
|                      | Unrelated organisations   | n.p.                                  | n.p.                           | 3,703                   |
|                      | Total   | n.p.                                  | n.p.                           | 4,129                   |
| Total overseas       | Related enterprises   | n.p.                                  | n.p.                           | 4,476                   |
|                      | Unrelated organisations   | 1,828                                 | 6,853                          | 8,682                   |
|                      | Total   | n.p.                                  | n.p.                           | 13,157                  |
| Australia            | Related enterprises   | n.a.                                  | n.a.                           | n.a.                    |
|                      | Unrelated organisations   | n.a.                                  | n.a.                           | n.a.                    |
|                      | Total   | 10,637                                | 15,642                         | 26,279                  |
| Total                | Related enterprises   | n.a.                                  | n.a.                           | n.a.                    |
|                      | Unrelated organisations   | n.a.                                  | n.a.                           | n.a.                    |
|                      | Total   | 12,800                                | 26,636                         | 39,436                  |
|                      | Private business enterprise contribution to 'Total all industries'— |                                       |                                |                         |
|                      | 1981-82   | n.p.                                  | n.p.                           | 32,023                  |
|                      | 1978-79   | 9,354                                 | 7,608                          | 16,962                  |

(a) ASIC Division C. (b) ASIC Divisions B, D-L. (c) Excludes ASIC Division A.



**TABLE 16. PAYMENTS AND RECEIPTS FOR TECHNICAL KNOW-HOW BY BUSINESS ENTERPRISES(a), AUSTRALIA**  
**PAYMENTS AND RECEIPTS BY INDUSTRY OF ENTERPRISE(b)**  
 (\$ m)

| <i>Industry of enterprise(b)</i> |   | <i>Payments for technical know-how</i> |                |                | <i>Receipts for technical know-how</i> |                |                |
|----------------------------------|---|--|----------------|----------------|--|----------------|----------------|
| <i>ASIC code</i>                 | <i>Description</i>  | <i>1976-77</i>                         | <i>1978-79</i> | <i>1981-82</i> | <i>1976-77</i>                         | <i>1978-79</i> | <i>1981-82</i> |
|                                  | <b>Manufacturing—</b>   |  |                |                |  |                |                |
| 21                               | Food, beverages and tobacco   | 2.9                                    | 4.0            | 14.9           | 0.3                                    | 0.4            | —              |
| 23-24                            | Textiles, clothing and footwear   | 1.4                                    | 1.2            | 1.4            | n.p.                                   | n.p.           | —              |
| 25                               | Wood, wood products and furniture   | 0.1                                    | 1.2            | 1.2            | n.p.                                   | n.p.           | —              |
| 26                               | Paper, paper products, printing and publishing  | 0.5                                    |                |                | n.p.                                   | 0.1            | n.p.           |
| 27                               | Chemicals, petroleum and coal products  | 16.1                                   | 27.4           | 36.3           | 2.4                                    | 3.2            | 3.6            |
| 28                               | Non-metallic mineral products   | 4.0                                    | 4.4            | 5.6            | 0.7                                    | 0.9            | n.p.           |
| 29                               | Basic metal products  | 3.1                                    | 4.0            | 7.6            | 1.2                                    | 0.6            | 2.0            |
| 31                               | Fabricated metal products   | 1.4                                    | 1.4            | 3.3            | 0.8                                    | 1.3            | 0.7            |
| 32                               | Transport equipment   | 7.1                                    | 10.1           | 10.8           | 0.3                                    | 0.5            | 2.0            |
| 334,335                          | Photographic, professional and scientific equipment and appliances and electrical equipment | 12.4                                   | 18.6           | 11.7           | 0.6                                    | 0.9            | 1.3            |
| 336                              | Industrial machinery and equipment  | 3.8                                    | 3.3            | 3.2            | 0.6                                    | 0.2            | 0.2            |
| 33                               | Total other machinery and equipment   | 16.2                                   | 21.9           | 14.9           | 1.2                                    | 1.1            | 1.5            |
| 34                               | Miscellaneous manufacturing   | 3.1                                    | 3.9            | 3.3            | 0.5                                    | 0.5            | 0.9            |
| <i>C</i>                         | <i>Total manufacturing</i>  | <i>55.8</i>                            | <i>79.5</i>    | <i>99.2</i>    | <i>7.5</i>                             | <i>8.8</i>     | <i>11.5</i>    |
| <i>(c)</i>                       | <i>Other industries</i>   | <i>13.7</i>                            | <i>r29.1</i>   | <i>27.4</i>    | <i>1.7</i>                             | <i>6.6</i>     | <i>5.9</i>     |
|                                  | <b>Total all industries</b>   | <b>69.5</b>                            | <b>r108.6</b>  | <b>126.6</b>   | <b>9.2</b>                             | <b>15.4</b>    | <b>17.4</b>    |

(a) Excludes enterprises in ASIC Division A. (b) 1978-79 and 1981-82 data are classified by the 1978 edition of ASIC; 1976-77 data are classified by the 1969 edition of ASIC. If the 1978 edition were used to classify the 1976-77 data shown here only minor differences would occur. (c) ASIC Divisions B, D-L.

TABLE 17. PAYMENTS BY BUSINESS ENTERPRISES FOR TECHNICAL KNOW-HOW, AUSTRALIA, 1981-82  
PAYMENTS BY INDUSTRY OF ENTERPRISE

|                                       |   |                             |                |                                   |                          | Payments made overseas    |                              |  |                        |                                  |               |                |
|---------------------------------------|---|-----------------------------|----------------|-----------------------------------|--------------------------|---------------------------|------------------------------|--|------------------------|----------------------------------|---------------|----------------|
| Industry of enterprise making payment |   | Enterprises making payments | Total payments | Type of technical know-how        |                          | Payments within Australia | Total payments made overseas | Relationship of recipient to enterprise making payment |                        | Country to which payment made(a) |               |                |
|                                       |   |                             |                | Patent licence fees and royalties | Other technical know-how |                           |                              | Related enterprise                                     | Unrelated organisation | U.K.                             | U.S.A.        | Other overseas |
| ASIC code                             | Description   | number                      | \$' 000        | \$' 000                           | \$' 000                  | \$' 000                   | \$' 000                      | \$' 000  | \$' 000                | \$' 000                          | \$' 000       | \$' 000        |
|                                       | <b>Manufacturing—</b>   |                             |                |                                   |                          |                           |                              |  |                        |                                  |               |                |
| 21                                    | Food, beverages and tobacco   | 15                          | 14,864         | n.p.                              | n.p.                     | n.p.                      | n.p.                         | n.p.   | n.p.                   | n.p.                             | n.p.          | n.p.           |
| 23-24                                 | Textiles, clothing and footwear   | 6                           | 1,398          | n.p.                              | n.p.                     | —                         | 1,398                        | 1,202  | 196                    | —                                | n.p.          | n.p.           |
| 25                                    | Wood, wood products and furniture   | 6                           | 1,201          | 340                               | 861                      | —                         | 1,201                        | 1,123  | 78                     | 67                               | 1,134         | —              |
| 26                                    | Paper, paper products, printing and publishing  |                             |                |                                   |                          |                           |                              |  |                        |                                  |               |                |
| 2763                                  | Pharmaceutical and veterinary products  | 11                          | 9,547          | 7,670                             | 1,877                    | 405                       | 35,911                       | 29,758   | 6,153                  | 7,193                            | 20,934        | 7,785          |
| (b)                                   | Chemicals, petroleum and coal products  | 36                          | 26,769         | 16,844                            | 9,925                    | —                         | 5,577                        | 4,895  | 681                    | 4,708                            | 304           | 564            |
| 28                                    | Non-metallic mineral products   | 10                          | 5,577          | n.p.                              | n.p.                     | —                         | 5,577                        | 4,895  | 681                    | 4,708                            | 304           | 564            |
| 29                                    | Basic metal products  | 11                          | 7,603          | 4,817                             | 2,786                    | n.p.                      | n.p.                         | n.p.   | n.p.                   | n.p.                             | n.p.          | n.p.           |
| 31                                    | Fabricated metal products   | 23                          | 3,277          | 782                               | 2,495                    | 244                       | 3,032                        | 599  | 2,434                  | 168                              | 1,848         | 1,017          |
| 32                                    | Transport equipment   | 17                          | 10,835         | 5,858                             | 4,977                    | 134                       | 10,701                       | 6,835  | 3,866                  | 700                              | 2,104         | 7,896          |
| 334,335                               | Photographic, professional and scientific equipment and appliances and electrical equipment | 38                          | 11,666         | 3,183                             | 8,482                    | 190                       | 11,476                       | 8,842  | 2,633                  | n.p.                             | 6,066         | n.p.           |
| 336                                   | Industrial machinery and equipment  | 28                          | 3,215          | 1,838                             | 1,378                    | 29                        | 3,187                        | 1,992  | 1,194                  | n.p.                             | 2,849         | n.p.           |
| 33                                    | Total other machinery and equipment   | 66                          | 14,881         | 5,021                             | 9,860                    | 219                       | 14,662                       | 10,834   | 3,827                  | 2,028                            | 8,915         | 3,720          |
| 34                                    | Miscellaneous manufacturing   | 18                          | 3,253          | 475                               | 2,778                    | n.p.                      | n.p.                         | n.p.   | n.p.                   | n.p.                             | n.p.          | n.p.           |
| C                                     | Total manufacturing   | 219                         | 99,204         | 58,085                            | 41,119                   | 2,193                     | 97,010                       | 71,862   | 25,149                 | 15,969                           | 45,363        | 35,679         |
|                                       | <b>Mining and other industries—</b>   |                             |                |                                   |                          |                           |                              |  |                        |                                  |               |                |
| F                                     | Wholesale and retail trade  | 28                          | 13,076         | 3,027                             | 10,050                   | 96                        | 12,980                       | 12,376   | 604                    | 2,205                            | 8,139         | 2,637          |
| (c)                                   | Mining and other n.e.c.   | 37                          | 14,304         | 8,315                             | 5,989                    | 209                       | 14,095                       | 9,180  | 4,914                  | 365                              | 11,736        | 1,994          |
| B, D-L                                | Total mining and other industries   | 65                          | 27,380         | 11,341                            | 16,039                   | 305                       | 27,075                       | 21,556   | 5,519                  | 2,569                            | 19,875        | 4,630          |
|                                       | <b>Total all industries(d)</b>  | <b>284</b>                  | <b>126,584</b> | <b>69,426</b>                     | <b>57,158</b>            | <b>2,499</b>              | <b>124,085</b>               | <b>93,418</b>  | <b>30,668</b>          | <b>18,539</b>                    | <b>65,238</b> | <b>40,309</b>  |
|                                       | Private business enterprise contribution to 'Total all industries'—                         |                             |                |                                   |                          |                           |                              |  |                        |                                  |               |                |
|                                       | 1981-82   | 280                         | 126,395        | 69,419                            | 56,976                   | 2,471                     | 123,924                      | 93,418   | 30,506                 | 18,538                           | 65,090        | 40,297         |
|                                       | 1978-79   | 346                         | 108,317        | 49,392                            | 58,925                   | 1,766                     | 106,551                      | 78,982   | 27,569                 | 17,206                           | 59,200        | 30,145         |

(a) For further information see also Table 18. (b) ASIC Subdivision 27 excluding ASIC Class 2763. (c) ASIC Divisions B, D-E, G-L. (d) Excludes ASIC Division A.

**TABLE 18. PAYMENTS BY BUSINESS ENTERPRISES FOR TECHNICAL KNOW-HOW, AUSTRALIA, 1981-82**  
**PAYMENTS BY COUNTRY OF RECIPIENT(a)**  
(\$' 000)

|  | Australia | Canada | Federal<br>Republic<br>of Germany | France | Japan | U.K.   | U.S.A. | Other<br>countries | Total   |
|--|-----------|--------|-----------------------------------|--------|-------|--------|--------|--------------------|---------|
| Total all industries(b)  | 2,499     | 368    | 6,662                             | 1,792  | 6,699 | 18,539 | 65,238 | 24,787             | 126,584 |
| Private business enterprise contribution<br>to 'Total all industries'— |           |        |                                   |        |       |        |        |                    |         |
| 1981-82  | 2,471     | 367    | 6,662                             | 1,792  | 6,698 | 18,538 | 65,090 | 24,777             | 126,395 |
| 1978-79  | 1,766     | 1,234  | 10,514                            | 2,958  | 3,542 | 17,206 | 59,200 | 11,897             | 108,317 |

(a) For further information see also Table 17. (b) Excludes ASIC Division A.

**TABLE 19. RECEIPTS BY BUSINESS ENTERPRISES FOR TECHNICAL KNOW-HOW, AUSTRALIA, 1981-82**  
**RECEIPTS BY INDUSTRY OF ENTERPRISE**

TECHNOLOGICAL KNOW-HOW, AUSTRALIA, 1981-82

RECEIPTS BY INDUSTRY OF ENTERPRISE

| Industry of recipient enterprise |   | Recipient enterprises | Total receipts | Type of technical know-how        |                          | Receipts from within Australia | Receipts from overseas       |  |                        | Country from which payment received(a) |         |                |
|----------------------------------|---|-----------------------|----------------|-----------------------------------|--------------------------|--------------------------------|------------------------------|--|------------------------|--|---------|----------------|
|                                  |   |                       |                | Patent licence fees and royalties | Other technical know-how |                                | Total receipts from overseas | Relationship of organisation making payments to recipient enterprise |                        | U.K.                                   | U.S.A.  | Other overseas |
|                                  |   |                       |                |                                   |                          |                                |                              | Related enterprise   | Unrelated organisation |  |         |                |
| ASIC code                        | Description   | number                | \$' 000        | \$' 000                           | \$' 000                  | \$' 000                        | \$' 000                      | \$' 000  | \$' 000                | \$' 000                                | \$' 000 | \$' 000        |
| C                                | Manufacturing   | 77                    | 11,481         | 8,065                             | 3,416                    | 1,927                          | 9,554                        | 4,150  | 5,404                  | n.p.                                   | n.p.    | 6,457          |
| B,D-I:                           | Mining and other industries   | 57                    | 5,911          | 1,587                             | 4,324                    | 3,249                          | 2,662                        | 970  | 1,692                  | n.p.                                   | n.p.    | 2,371          |
|                                  | Total all industries(b)   | 134                   | 17,393         | 9,653                             | 7,740                    | 5,177                          | 12,216                       | 5,120  | 7,096                  | 476                                    | 2,912   | 8,828          |
|                                  | Private business enterprise contribution to 'Total all industries'— |                       |                |                                   |                          |                                |                              |  |                        |  |         |                |
|                                  | 1981-82   | 130                   | 17,346         | 9,629                             | 7,718                    | 5,150                          | 12,196                       | 5,120  | 7,076                  | 476                                    | 2,892   | 8,828          |
|                                  | 1978-79   | 148                   | 13,878         | 5,322                             | 8,557                    | 2,305                          | 11,573                       | 5,867  | 5,706                  | 1,389                                  | 2,628   | 7,556          |

(a) For further information see also Table 20. (b) Excludes ASIC Division A

(a) For further information see also Table 20. (b) Excludes ASIC Division A.

**TABLE 20. RECEIPTS BY BUSINESS ENTERPRISES FOR TECHNICAL KNOW-HOW, AUSTRALIA, 1981-82**  
**RECEIPTS BY COUNTRY FROM WHICH PAYMENT WAS RECEIVED(a)**  
(\$' 000)

|  | Australia | Canada | Federal<br>Republic<br>of Germany | France | Japan | New<br>Zealand | U.K.  | U.S.A. | Other<br>countries | Total  |
|--|-----------|--------|-----------------------------------|--------|-------|----------------|-------|--------|--------------------|--------|
| Total all industries(b)  | 5,177     | 394    | 324                               |        | 819   | 1,687          | 476   | 2,912  | 5,604              | 17,393 |
| Private business enterprise contribution<br>to 'Total all industries'— |           |        |                                   |        |       |                |       |        |                    |        |
| 1981-82  | 5,150     | 394    | 324                               |        | 819   | 1,687          | 476   | 2,892  | 5,604              | 17,346 |
| 1978-79  | 2,305     | 208    | 211                               |        | 477   | 2,062          | 1,389 | 2,628  | 4,598              | 13,878 |

(a) For further information see also Table 19. (b) Excludes ASIC Division A.

**TABLE 21. PATENT ACTIVITY BY BUSINESS ENTERPRISES WITH RESEARCH AND EXPERIMENTAL DEVELOPMENT ACTIVITY IN 1981-82, AUSTRALIA, JULY 1979—JUNE 1982**  
**DETAILS BY INDUSTRY OF ENTERPRISE**

| Industry of enterprise with patent activity |  | Number of enterprises with patent activity<br>during the period July 1979—June 1982 |   |  |   | Patent activity during the period<br>July 1979—June 1982 |                                    |  |                                |
|---|--|---|---|--|---|--|------------------------------------|--|--------------------------------|
|   |  | Enterprises<br>lodging<br>patent<br>applications<br>in<br>Australia                 | Enterprises<br>with<br>patents<br>granted in<br>Australia | Enterprises<br>lodging<br>patent<br>applications<br>overseas | Enterprises<br>with<br>patents<br>granted<br>overseas | Patent<br>applications<br>lodged in<br>Australia         | Patents<br>granted in<br>Australia | Patent<br>applications<br>lodged<br>overseas | Patents<br>granted<br>overseas |
| ASIC code                                   | Description  |   |   |  |   |  |                                    |  |                                |
|   | <b>Manufacturing—</b>  |   |   |  |   |  |                                    |  |                                |
| 21  | Food, beverages and tobacco  | 9   | 4   | 5  | 4   | 18   | 11                                 | 31   | 25                             |
| 23-24                                       | Textiles, clothing and footwear  | 4   | n.p.  | 3  | n.p.  | 10   | n.p.                               | 15   | n.p.                           |
| 25  | Wood, wood products and furniture  | n.p.  | n.p.  | n.p.   | n.p.  | n.p.   | n.p.                               | n.p.   | n.p.                           |
| 26  | Paper, paper products, printing and publishing   | n.p.  | 3   | n.p.   | 3   | n.p.   | 13                                 | n.p.   | 25                             |
| 2763  | Pharmaceutical and veterinary products   | 6   | 3   | n.p.   | n.p.  | 15   | 11                                 | n.p.   | n.p.                           |
| (a)   | Chemicals, petroleum and coal products   | 22  | 12  | 16   | 10  | 92   | 62                                 | 722  | 210                            |
| 28  | Non-metallic mineral products  | 5   | 3   | n.p.   | n.p.  | 13   | 8                                  | n.p.   | n.p.                           |
| 29  | Basic metal products   | 8   | 8   | 6  | 7   | 54   | 34                                 | 192  | 170                            |
| 31  | Fabricated metal products  | 30  | 20  | 16   | 14  | 153  | 52                                 | 102  | 50                             |
| 32  | Transport equipment  | 14  | 7   | 6  | n.p.  | 45   | 19                                 | 122  | n.p.                           |
| 334-335                                     | Photographic, professional and scientific equipment<br>and appliances and electrical equipment | 48  | 29  | 26   | 18  | 197  | 114                                | 430  | 179                            |
| 336   | Industrial machinery and equipment   | 53  | 33  | 37   | 25  | 228  | 89                                 | 420  | 296                            |
| 33  | Total other machinery and equipment  | 101   | 62  | 63   | 43  | 425  | 203                                | 850  | 475                            |
| 34  | Miscellaneous manufacturing n.e.c.   | 19  | 15  | 12   | 9   | 53   | 26                                 | 173  | 131                            |
| C   | <b>Total manufacturing</b>   | 222   | 140   | 134  | 99  | 915  | 456                                | 2,310  | 1,198                          |
|   | <b>Mining and other industries—</b>  |   |   |  |   |  |                                    |  |                                |
| F   | Wholesale and retail trade   | 30  | 12  | 14   | 7   | 65   | 28                                 | 64   | 37                             |
| 63  | Property and business services   | 41  | 24  | 30   | 21  | 103  | 39                                 | 419  | 192                            |
| (b)   | Mining and other n.e.c.  | 26  | 17  | 12   | 10  | 66   | 37                                 | 140  | 100                            |
| B, D-I.                                     | <b>Total mining and other industries</b>   | 97  | 53  | 56   | 38  | 234  | 104                                | 623  | 329                            |
|   | <b>Total all Industries(c)</b>   | 319   | 193   | 190  | 137   | 1,149  | 560                                | 2,933  | 1,527                          |

(a) ASIC Subdivision 27 excluding ASIC Class 2763. (b) ASIC codes B, D-E, G-H, 61-62, K-L. (c) Excludes ASIC Division A.