

AUSTRALIAN Science and Technology Council

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to the Prime Minister by the Australian
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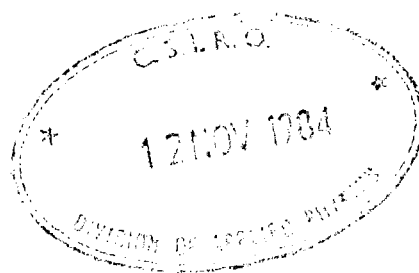
Guidelines for of National Research Facilities

**A report to the Prime Minister
by the Australian Science
and Technology Council (ASTEC)**

**GUIDELINES FOR THE OPERATION
OF NATIONAL RESEARCH FACILITIES**

**A report to the Prime Minister
by the
Australian Science and Technology Council (ASTEC)**

January 1984



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REFER:

4 January 1984

My dear Prime Minister,

GUIDELINES FOR THE OPERATION OF
NATIONAL RESEARCH FACILITIES

We have the honour to submit to you a report by ASTEC proposing guidelines for the operation of national research facilities. These facilities are major, expensive items of equipment, buildings or other units which are provided by the Government specifically for joint use by several research groups or organisations. ASTEC has made several recommendations in the report which will, we believe, help to ensure that such facilities are used efficiently and to maximum national benefit.

Yours sincerely,



(R.O. Slatyer)
Chairman



(J.H. Carver)
Deputy Chairman

For and on behalf of:

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Sir Samuel Burston
Mr J.N. Davenport
Professor D.H. Green
Professor P.I. Korner
Mr K.H. McLeod
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The Right Honourable R.J.L. Hawke, AC, MP,
Prime Minister,
Parliament House,
CANBERRA A.C.T. 2600

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WORKING PARTY ACTIVITIES

1.1 In Volume 1A of its report 'Science and Technology in Australia 1977-78', ASTEC made a number of comments and recommendations concerning national and regional facilities. The recommendations were considered by the Government and endorsed in 1979; they have become the basis on which proposals for expensive scientific equipment or facilities are considered. The purpose of this report is to develop further the broad policy guidelines recommended by ASTEC for the establishment and operation of national or regional research facilities, whilst recognising the need for flexibility to take account of the particular characteristics and needs of individual facilities.

1.2 It will be useful to define what is meant by the term 'national research facility'. In essence, the term denotes substantial instrumentation, equipment or other physical entity constructed or established to satisfy an identified national research need and which, because of expense or capabilities, is justified only on the basis of shared use by scientists of several organisations. The primary criteria are that the facility is specifically identified as being for national use, and that it is made available to scientists according to the merit of their proposals. Equipment or a facility established and owned by one organisation and made available for occasional use by 'outside' scientists does not constitute a national research facility.

1.3 There is currently no national research facility, as defined above, operating in Australia although two are under construction; these are the oceanographic research vessel to be operated by the CSIRO Division of Oceanography, and the Australia Telescope to be operated by the CSIRO Division of Radiophysics. However, several major, shared research facilities are in operation. These were established before the concept of a national research facility was reflected in policy decisions, and therefore are not necessarily managed and operated as equipment provided specifically as a national facility. They do not fall within the definition of a national research facility and there is no intention to alter existing management arrangements, although the possibility of their future recognition as national research facilities, if proposed by operators and users, should not be precluded.

Management of National Research Facilities

1.4 ASTEC considers that in view of the significant advantages which result (paragraph 3.3), a national research facility should be associated with and operated by a suitable host institution. The prime criterion for selecting a suitable institution should be scientific, that is, its staff should be actively involved in the relevant field of research and development and preferably should be potential major users of the facility.

1.5 There is a need to balance the advantages of management by a host institution against the requirement of impartiality in the operation of the facility. As recommended by ASTEC in its earlier report, a steering

committee should be established for each facility to develop policy guidelines for the long-term operation of the facility, and to determine an appropriate level of charges to users; the host institution would be responsible for management and operation of the facility within the broad guidelines established by the steering committee. In most instances the steering committee, or a sub-group of it, will also allocate the time available at the facility. Each steering committee should prepare a brief annual report to the responsible Minister giving details of the financing and operations of the facility, including the allocation of time, so that users and others can be assured that the facility is being operated in an impartial and efficient manner. The steering committee should be appointed by the Minister who has been responsible for placing the proposal for the facility before the Government.

Recommendation 1

(i) That an independent steering committee be appointed for each new national research facility to establish policy guidelines for its operation, to allocate time and determine an appropriate scale of charges, and to promote wide and effective use of the facility;

(ii) That any new national research facility be established in association with an appropriate host institution which has responsibility for the management of the facility within the broad guidelines set by the steering committee; and

(iii) That each steering committee prepare a brief annual report to the responsible Minister giving details of the facility's finances and operations, including the allocation of time.

1.6 It has been suggested that the host institution should be given an incentive, in the form of a guaranteed proportion of the research time available at the facility, to ensure that the required level of effort and resources continue to be made available to the facility. ASTEC does not agree with this view; in fact, it could be argued that such an arrangement negates the whole concept of shared use based on merit. In practice, the staff of the host institution would be expected to obtain a substantial share of the time available because of the excellence of their research proposals; if this were not so, it is questionable whether the host institution could be a suitable location for the facility. This share would be expected to be more than adequate to allow for any special needs of the host institution (3.2). The provision of time to research projects other than those judged to be of the highest merit would onle facility.

Recommendation 2

(i) That, as a general policy, no guaranteed allocation of research time at a national research facility be made for the host institution or for any other users, and that all proposed projects be assessed on their merits; and

(ii) That the allocation of time to the host institution for purposes other than research, such as maintenance of the facility or testing new equipment, be determined by discussion between the host institution and the steering committee.

Charges to Users

1.7 If time at a national research facility is made available free of charge, that is, if all costs are met directly by the government, its continued operation may lead to a wasteful use of resources. If, on the other hand, charges are levied which reflect project costs, government can be sure that a subsequent high rate of usage reflects a continuing need for the facility perceived by scientists and by relevant funding bodies. In other words, when scientists have to use a part of their research budget to pay for access to a national research facility, the rate of use provides a valuable measure of the continuing need for the facility.

1.8 The costs associated with establishing and operating a national research facility can be divided into the categories of capital, operating and project. Capital costs are those required to establish the physical entity of the facility, and include design costs, the purchase of scientific instruments or equipment, construction of a building, commissioning and so on. Operating costs are expenditures required to develop and maintain the facility in a state of readiness for its research functions, including the salaries of technical, maintenance and administrative staff, direct maintenance costs, and a proportion of the overhead costs of power, lighting, telephones etc. Project costs are defined as those related to the use of the facility for a particular research project. They might include consumable items used in the research, and accommodation costs for visiting scientists. Project costs represent the marginal cost of the conduct of a research project, and it is reasonable for this cost to be borne by the investigators from existing resources outside the facility. In general, charges should attempt to recover all project costs associated with a particular program of research, but not operating or capital costs.

Recommendation 3

That, as a general policy, charges for use of a national facility for research be levied at a rate sufficient to recover all project costs but not capital or operating expenditure.

Providing Financial Support

1.9 When a decision is taken by government to support the creation of a new facility, a steering committee should be appointed by the relevant Minister and, where necessary, agreement reached on an appropriate host institution to manage the establishment and operation of the facility. In most instances, a decision to proceed with a new facility will include provision of an initial allocation of capital within the Budget to allow planning and establishment of the facility to begin. The further sums required, as specified in the original proposal, will be provided as annual Budget allocations to the host institution, so that each year the steering committee and host institution will need to develop jointly a submission for the next year's funds.

1.10 Provision of capital and operating funds for a national research facility within the budget of its host institution, without separate identification, may result in conflicts of interest, especially during a period of severe expenditure restraint. On the one hand there is the danger that savings in expenditure will be achieved through disproportionately heavy reduction of the facility's operations; on the other hand, continued full operation of the facility in response to demand might become an unreasonable drain on the host institution's own resources. There are clear advantages in keeping the funds for the facility, which has been established for national use, identified separately from those of the host institution (5.5 - 5.7).

Recommendation 4

(i) *That annual estimates of funds required for capital and operating expenditures of a national research facility be developed jointly by the steering committee and host institution; and*

(ii) *That funds provided to the host institution for such expenditures be provided as specific allocations identified separately from, or within, the institution's budget.*

1.11 The arguments in support of ASTEC's view that charges, consisting of project costs only, should be levied on users of national research facilities are set down in Section 4. Under this system, time on the facility would be allocated by the steering committee, and research groups or individual scientists would have to provide the project costs for their work from existing resources. Charges to cover project costs would have to be met before the project could proceed, so that there would be a strong mechanism to ensure that charges were collected and that use of the facility was based on real need (5.9 - 5.13).

1.12 An alternative to this procedure, which might be suitable for some types of facility, is that adopted by the Australian Institute of Nuclear Science and Engineering (AINSE - see 2.11, 2.12). Organisations whose research staff use the facility would pay an annual membership fee. Scientists, once their proposal was accepted, would pay the project costs for use of the facility, but these would be partially or completely re-imbursed using the membership funds, or other funds available to the steering committee. Such funds could also be used to support student research, to employ technical staff and to subsidise travel costs for users from remote locations (thus preserving the 'national' identity of the facility). This procedure has the advantages that scientists whose research proposals are accepted can be sure of some support to cover project costs, and that member organisations, having paid a fee, have a strong incentive to ensure that the facility is used effectively and maintained properly.

Recommendation 5

That charges for use of a national research facility be met by users from their existing resources, recognising that there are several ways in which these resources can be marshalled to cover project costs.

2.1 The purpose of this report is to develop further the broad policy guidelines recommended by ASTEC for the establishment and operation of national and regional research facilities. It is intended to assist research groups or organisations wishing to propose the establishment of a new, shared research facility, and those agencies which have the responsibility of managing and operating such a facility. This section of the report provides a brief review of current policies, and of existing shared research facilities. Later sections are concerned with the management of national research facilities, with levying charges on their users, and with mechanisms for providing the finance required. Although the term 'national research facility' is used throughout the report, the comments and recommendations apply also to the management and operation of regional facilities.

CURRENT POLICIES

2.2 In Volume 1A of its report 'Science and Technology in Australia 1977-78', ASTEC made a number of comments and recommendations concerning national and regional facilities. The Council pointed out that, in some fields of endeavour, effective research and development is not possible without the use of expensive equipment or special facilities. In some instances, it may be possible for a single organisation or research group to justify provision of such facilities exclusively for its own use. In other cases expensive equipment or facilities may be justified only on the basis of shared use by several groups. The concept of a 'national research facility' has been developed to encompass equipment or facilities in the latter category that are established and operated for the purposes of research with a substantial contribution of government funds, sought and provided specifically for that purpose.

2.3 ASTEC noted that there was general agreement on the principle of making expensive facilities available to more than one investigator or research group, and that in order to ensure that best use was made of such facilities, emphasis in the allocation of time or resources should be placed on the merit of research proposals. Most of the submissions and comments received by ASTEC at that time were concerned with the need to establish mechanisms for government consideration of proposals for expensive equipment, and for the funding of those which could not be provided through existing channels. After considering possible mechanisms, ASTEC made the following recommendations:

That all requests from individual research workers or teams for extra Commonwealth funds for the purchase of facilities costing \$1.0 million or more, after approval by the relevant institution or institutions, be forwarded to ASTEC for comment, evaluation and recommendation to the Government.

That Government approval of proposals for the provision of a facility costing \$1.0 million or more be on the explicit understanding that, except where full-time use by one research group is justified, the facility is provided for national or regional use; that a steering committee be appointed by the appropriate authority and arrangements made for the day-to-day management with an existing organisation on an appropriate contract basis; that when no suitable organisation exists, the steering committee take the responsibility for management; and that users of the facility be charged on an appropriate basis.

That requests for Commonwealth funds for items of scientific equipment or facilities costing between \$0.15 million and \$1.0 million from investigators in universities and in colleges of advanced education, or combined teams of investigators from these institutions and government laboratories or organisations, in fields of interest other than the medical and dental sciences, be assessed by the ARGC (Australian Research Grants Committee), placed in order of priority and submitted to the Minister for Science with supporting documentation; and that, if such requests are approved, the Government allocate additional funds through an appropriate agency specifically for the procurement of such facilities.

That requests for Commonwealth funds for scientific equipment or facilities costing between \$0.15 million and \$1.0 million in the medical and dental sciences be assessed by the National Health and Medical Research Council, placed in order of priority and submitted to the Minister for Health with supporting documentation; and that, if such requests are approved, the Government allocate funds to the National Health and Medical Research Council specifically for the procurement of such facilities.

2.4 ASTEC then went on to consider how national research facilities should be managed and operated. The Council concluded that a decision by government to establish a national research facility carried with it a commitment to provide both professional and technical support staff dedicated to its maintenance and efficient operation, and a budget for consumable items. The costs of this infrastructure were seen to be an intrinsic element of the facility which should therefore be included in the proposal. The Council recommended:

That a decision to construct a national or regional facility specify the arrangements for staffing and maintaining the facility for an agreed period of not less than three years, with the understanding that the arrangements will be reviewed after the agreed period.

2.5 ASTEC also discussed the need for additional funds to be provided from time to time to allow upgrading of a national research facility to take account of changes in technology, availability of new and improved equipment, and so on. It was suggested that, for a facility managed by a laboratory or organisation funded by the Commonwealth Government, requests for funds for upgrading should be included in the normal budget estimates of the agency so that a decision to proceed with upgrading could be taken in competition with other equipment expenditures. If the facility

was managed by a university or college, funds for upgrading could be made available from its own equipment grant or, if additional funds were necessary, a request could be dealt with by the same mechanism as new proposals. The Council recommended:

That requests for funds for upgrading of national or regional facilities be handled in the same way as requests for new facilities.

2.6 ASTEC pointed to the clear need to ensure that all expensive resources were used to the best advantage, and concluded that the use of national research facilities should not be free of cost to the users. The Council accepted that, in view of the high capital cost of many national research facilities, charging arrangements which attempted to recover this cost over the economic life of the facility would, in many cases, result in a prohibitive rate of charging to users and consequent failure to utilise the facility effectively. Nevertheless, a reasonable rate of charges was seen to be a useful mechanism to help ensure the most effective use of such facilities. The Council recommended:

That, wherever possible, practical and reasonable charges be made to users of national facilities to recover operating costs of the facilities.

2.7 The recommendations made by ASTEC were considered by the Government and endorsed in 1979; they have become the basis on which proposals for expensive scientific equipment or facilities are considered.

2.8 Since the publication of ASTEC's report in 1978, there has been considerable discussion and development of the concept of a national research facility. Particular attention has been given to the need for broad policy guidelines on how such facilities should be operated, on the determination of an appropriate level of charges, and on how proposals for new facilities should be developed for consideration by government. In view of the increased interest in national research facilities, and because several were under construction or proposed, ASTEC decided, in April 1982, to examine these issues in greater detail. Although there is clearly a need for a flexible approach because of the wide range of research facilities to be considered, some characteristics are common to all. ASTEC has therefore developed general recommendations in this report, bearing in mind that specific details of operational policy for each individual facility will need to be developed by its steering committee.

EXISTING MAJOR, SHARED RESEARCH FACILITIES

2.9 It will be useful to define, at the outset of the discussion, what is meant by the term 'national research facility'. In essence, the term denotes substantial instrumentation, equipment or other physical entity constructed or established to satisfy an identified national research need and which, because of expense or capabilities, is justified only on the basis of shared use by scientists of several organisations. The primary criteria are that the facility is specifically identified as being for national use, and that

it is made available to scientists according to the merit of their proposals. Equipment or a facility established and owned by one organisation and made available for occasional use by 'outside' scientists does not constitute a national research facility.

2.10 There is currently no national research facility, as defined above, operating in Australia although two are under construction; these are the oceanographic research vessel to be operated by the CSIRO Division of Oceanography, and the Australia Telescope to be operated by the CSIRO Division of Radiophysics. However, several major, shared research facilities are in operation. These were established before the concept of a national research facility was reflected in policy decisions, and therefore are not necessarily managed and operated as equipment provided specifically as a national facility. The purpose of the brief descriptions given below of some of the existing facilities is to illustrate the range of organisational arrangements which has been developed, as these may provide a guide for successful operation of future national facilities. ASTEC stresses that these existing shared facilities do not fall within the definition of a national research facility, and that there is no intention to alter existing management arrangements.

Australian Institute of Nuclear Science and Engineering (AINSE)

2.11 AINSE has been in operation for 25 years. Its primary objective is to provide access by research groups from universities and other institutions to the HIFAR nuclear reactor and other specialised facilities at the Lucas Heights Research Laboratories near Sydney, which are operated by the Australian Atomic Energy Commission (AAEC) and the CSIRO Division of Energy Chemistry. AINSE also provides support for other research relevant to the nuclear field, or using nuclear techniques. The operating funds for AINSE are made up of annual membership subscriptions from the constituent organisations (universities, AAEC and CSIRO) and an annual 'Contribution for Research and Training' provided by the Commonwealth Government through the AAEC. Total expenditure in 1982 was almost \$0.75 million. The Institute has a Council and Executive Committee, several scientific and technical committees, an Executive Officer and nine staff members. It allocates funds for Fellowships and Research Studentships and for the costs of visiting scientists who wish to use the reactors and other facilities at Lucas Heights. These account for approximately 32% of expenditure. Direct grants to member organisations in support of research proposals account for a further 12% of expenditure, and the remainder is spent on salaries for scientific and technical staff (22%), provision and upgrading of equipment at Lucas Heights (14%), and administration 20%). Allocations are made in accordance with policies approved by the AINSE Council.

2.12 Use of the neutron beams from HIFAR by AINSE-sponsored researchers is not a drain on the reactor's output and since there would be no savings in the cost of operating HIFAR if AINSE ceased to utilise the neutron beams, no charge is levied. In summary, AINSE operates as a co-ordinating body to obtain and disburse funds, to assist access to the national facilities at Lucas Heights and to ensure that the most effective use

is made of these facilities. The AINSE mechanism is essential if the installations at Lucas Heights are to be used efficiently as a national research resource.

Anglo-Australian Telescope (AAT)

2.13 The AAT was inaugurated in October 1974 following representations to the Australian and British governments by the Australian Academy of Science and the Royal Society of London. The two governments established an agreement in 1971 under which the costs of the construction, operation and maintenance of the Telescope were to be shared equally, whilst observing time was to be available in equal shares to astronomers from the United Kingdom and from Australia. Responsibility for implementing the agreement was shared between the Science Research Council in the United Kingdom and what is now the Department of Science and Technology in Australia. The Telescope is located at the site of the Australian National University's Observatory at Siding Springs Mountain, near Coonabarabran in New South Wales. The Telescope is managed by the independent Anglo-Australian Telescope Board and has its own permanent staff of about 50, responsible to the Director. The Board's annual budget is approximately \$3.5 million, and fixed assets associated with the Telescope are currently valued in excess of \$18 million.

2.14 Assignment of observing time at the Telescope is the responsibility of committees based in the United Kingdom and Australia, each allocating its own half-share of the total time based on the merit of the proposals brought forward. The Telescope's staff also apply for observing time to these committees. There are no funds available from the AAT to support observers visiting the Telescope so that travelling and other expenses for observers and their equipment must be obtained from elsewhere. Some consumable supplies are provided free, for example, photographic plates and some computer supplies, but items such as liquid helium must be paid for. Australian observers wishing to use the Telescope normally obtain their funds as research grants from the Australian Research Grants Scheme, but funds are not automatically granted when time is assigned. Occasions have arisen when scientists have been unable to use the time assigned to them because they were unable to attract the required funding.

Australian National Radio Astronomy Observatory (ANRAO)

2.15 ANRAO, formerly known as the Parkes Radiotelescope, is managed and operated by CSIRO, primarily for use by its own research scientists. However, for some years, CSIRO has made time available for outside users. Time is allocated by a committee of CSIRO and non-CSIRO radioastronomers on the basis of the scientific merit of proposals. Charges are levied for accommodation and for some consumable items, but not for use of the telescopes and associated equipment.

National Nuclear Magnetic Resonance (NMR) Centre

2.16 The National NMR Centre at the Australian National University was established in 1975 with the aim of providing NMR services for general use by the Australian scientific community. The charges levied by the Centre were based on three classes of users. Recipients of grants from the Australian Research Grants Scheme (ARGS) were allocated time by the Scheme's Committee after receiving advice from the Centre's Director; no charges were levied on ARGS grantees. Other university users who wished to use the centre were charged approximately \$30 per hour, and scientists and others in CSIRO and industry were charged marginally more than university users. ARGS grantees were given priority for use of the Centre's equipment, while users in the second two categories were accommodated on a first come, first served basis. Funds for the operation of the Centre were provided by the Commonwealth Government through the Department of Science and Technology, and hourly fees for its use were set so that all recurrent costs would be recovered. Following a recommendation by ASTEC in 1978 that the Centre's funding arrangements be re-examined with a view to encouraging greater use, charges were levied on all users.

2.17 In late 1982 the Centre was closed. The clientele wishing to make use of the Centre's services had gradually declined as universities and CSIRO research groups had purchased their own high-field NMR equipment, the price of which had decreased substantially over recent years. The Centre eventually began to return a financial loss on its operations, leading to the decision to close it: no provision had been made for upgrading its instrumentation. The equipment will be retained within the Australian National University and will be used by scientists at the Research School of Chemistry and other schools and departments.

OTHER RESEARCH FACILITIES

2.18 In 1979, CSIRO purchased a Fokker F27 'Friendship' aircraft from the Department of Transport to replace its ageing DC3 used for cloud physics research. The newer aircraft was extensively modified to carry all the necessary equipment and sensors for a wide range of physical measurements associated with the study of clouds and the lower atmosphere. Although originally purchased for exclusive research use by the Division of Cloud Physics, the aircraft is now operated as a CSIRO facility following the termination of the cloud-seeding program and an organisational restructuring which resulted in abolition of the Division. Users from outside CSIRO may also be considered in the future. Capital cost of the aircraft in its research configuration would be approximately \$1.7 million at current values. To recover all operating costs, estimated to be \$0.8 million in 1982-83, (based on 400 hours maximum flying use per year), a charge of \$2,000 per hour would have to be made, of which \$450 per hour would recover marginal costs. To encourage use of the aircraft, CSIRO decided initially to charge an amount similar to commercial light aircraft fees - \$150 per day standing

charge plus \$75 per hour. On this basis the next year's utilisation has already been well subscribed within CSIRO. Research proposals involving the F27 are assessed by the F27 Operating Committee convened by the CSIRO Institute of Physical Sciences, and funds are provided by the users, who obtain them as part of their allocations from CSIRO's budget.

2.19 The Royal Australian Navy operates three vessels for oceanographic and hydrographic survey and research, including the recently commissioned HMAS 'Cook'. Time is allocated by the Hydrographer's Office based on whether the proposals fit in with the Navy's own program and on their merit. No charge is made, other than a moderate rate for board and lodging during the voyage. CSIRO currently charters two vessels for fisheries and oceanographic research, and participation by non-CSIRO scientists in the research cruises, and accommodation of their own research projects, has been actively encouraged.

FACILITIES UNDER CONSTRUCTION OR PROPOSED

2.20 Several proposals have been brought forward in recent years for expensive equipment or structures. In several cases, it has been specifically proposed that these be established as national facilities and made available for a range of users from different organisations.

2.21 In April 1980 the Government agreed to a CSIRO proposal for a 54-metre oceanographic research vessel. In December 1982 a contract for construction of the vessel was placed at a price of \$12.2 million. The vessel will be managed and operated by the CSIRO Division of Oceanography as a national facility, and time will be made available for scientists from universities and other organisations who wish to carry out oceanographic research. CSIRO have initiated discussions on the allocation of time on the vessel and on what might constitute practical and reasonable charges for outside users in view of the relatively high running costs involved; these and related matters are also being examined by the Australian Marine Sciences and Technologies Advisory Committee (AMSTAC).

2.22 In August 1982 the Government announced that it would proceed with the construction of a new and improved radiotelescope, to be known as the Australia Telescope. This will consist of several 22-metre radio antennas which can be linked to the existing CSIRO 64-metre radiotelescope at Parkes. Five mobile antennas will make up an array 6 kms long at Culgoora, near Narrabri in New South Wales, and another will be located at Siding Spring Observatory near Coonabarabran. The Culgoora array will allow observations with a resolving power which matches the image size of the 3.9 metre optical telescope at the Anglo-Australian Observatory. The linking of all six new antennas with the large radiotelescope at Parkes and the 64-metre antenna at Tidbinbilla, near Canberra, will provide a unique array with a long baseline and greatly increased resolving power.

2.23 The Australia Telescope will be constructed over the next five years at a total cost of \$25 million in January 1982 prices. It will be managed and operated by the CSIRO Division of Radiophysics as a national

facility, and made available for radioastronomers from other organisations in Australia and from overseas. CSIRO will need to give consideration to mechanisms for allocating time at the Telescope to users, both CSIRO staff and others, and for levying charges in a manner consistent with general practice for astronomical facilities.

2.24 Several other proposals for equipment which could be viewed as constituting a national research facility have been received in recent years by the Minister for Science and Technology. A joint proposal from the universities of New South Wales, Macquarie, Tasmania and Flinders for a National Seismic Data Research Centre to cost approximately \$2.1 million over three years, which has been assessed by ASTEC, is being reconsidered by the proponents. It has also been suggested that the Consortium of Island Research Stations, in the Great Barrier Reef region, be designated and funded as a national research facility.

3.1 Before moving on to discuss the management of future national research facilities in more detail, it is important to bear in mind the distinction, provided in the definition given in paragraph 2.9, between a national research facility and a facility provided to or established by one organisation for its exclusive use and at which time may be made available to other users at that organisation's discretion. In the case of both the oceanographic research vessel and the Australia Telescope, the terms of the government decisions and the associated public announcements make it clear that although the facilities are to be owned and managed by divisions of CSIRO, they are to be operated as national facilities. It is therefore likely that the administrative arrangements required will be different from those appropriate for a facility established by CSIRO or other organisation primarily for its own use.

3.2 It is also important to recognise the special requirements which may be associated with a national research facility proposed by a single organisation. For example, the proposals for both the oceanographic research vessel and the Australia Telescope were developed over several years by CSIRO with assistance from other groups and individuals, and the Organization provided substantial resources of its own in order to do this. Moreover, the broad research objectives of the vessel and the telescope had been defined at the time of the decisions to construct them. Therefore there will be a need for compromise in the operation of these facilities between the requirement for impartial operation as a national research tool, and the necessity to recognise and take account of the responsibilities and research requirements of the CSIRO divisions concerned. Other national research facilities may be established in the future in similar circumstances which require that special recognition be given to the needs of the host institution because the facility is an essential element in its functional viability. The exact nature of the compromise to be made should be determined by the steering committee in each case. In the case of a national research facility proposed and established jointly, the management procedures should take into account the requirements of users without those of any one group being paramount.

Management Responsibilities

3.3 Any proposal for a new national research facility should include consideration of how the facility is to be managed in its day-to-day operations and, in the longer term, to ensure that its capabilities are maintained and, if required, upgraded. There are several advantages to be gained if the facility can be associated with a host institution which has experience and strong research interests in the same field of research and development. These advantages include;

- a reduction in the additional infrastructure required to manage the facility, as it should be possible to make some use of existing resources for administration, site services and maintenance if the host institution is of reasonable size;
- access to staff with the experience necessary to operate the facility and, because they are potential users, the motivation to maintain and improve the equipment and services offered by the facility;
- interaction of staff operating the facility with their scientific peers, thus overcoming potential difficulties of isolation within a small, highly specialised group; and
- less disruption in the event of a decision to scale down or terminate the facility as some staff could be redeployed within the (much larger) host institution.

3.4 ASTEC considers that in view of the significant advantages which result, a national research facility should be associated with and operated by a suitable host institution. The prime criterion for selecting a suitable institution should be scientific, that is, its staff should be actively involved in the relevant field of research and development and preferably should be potential major users of the facility.

3.5 There is a need to balance the advantages of management by a host institution against the requirement of impartiality in the operation of the facility. In its earlier comments on national research facilities, ASTEC recommended that a steering committee be established for each facility to make the necessary policy decisions. Each steering committee will not be merely an advisory body. It will have the responsibility to develop, in consultation with users and the host institution, the policy guidelines for the long-term operation of the facility; the host institution will have responsibility for management and operation of the facility within these guidelines. The steering committee will also have the tasks of determining an appropriate level of charges and of allocating the time available at the facility. If necessary, steering committees for the larger national research facilities might be assisted by one or more technical groups made up of users which could, for example, make arrangements for the external review and assessment of research proposals. When a facility is to be established following a joint proposal by several research groups, the first task of the steering committee will be to contract with a suitable host institution for its management.

3.6 Each steering committee, which will usually comprise part-time members and meet when required during the year, should be appointed by the Minister who has been responsible for placing the proposal for the facility before the Government (see paragraph 5.14). Membership should include representatives of users, including the host institution, but the committee should be able to operate independently. Each steering committee should be appointed well before the completion of establishment of the relevant facility so that management policies can be developed by the time the facility is ready for operation. In view of their important tasks, each

steering committee should be given the responsibility of preparing a brief annual report to the responsible Minister giving details of the financing and operations of the facility, including the allocation of time, so that users and others can be assured that the facility is being operated in an impartial and 'national' manner and that its equipment and services are being used efficiently.

ASTEC recommends:

- (i) That an independent steering committee be appointed for each new national research facility to establish policy guidelines for its operation, to allocate time and determine an appropriate scale of charges, and to promote wide and effective use of the facility;*
- (ii) That any new national research facility be established in association with an appropriate host institution which has responsibility for the management of the facility within the broad guidelines set by the steering committee; and*
- (iii) That each steering committee prepare a brief annual report to the responsible Minister giving details of the facility's finances and operations, including the allocation of time.*

3.7 Conflicts of interest could arise, especially in periods of severe constraint of expenditures, if the budget for a national research facility is included within that of its host institution. The budget for a national research facility should therefore be either separated from that of the host institution, or at least identified as a separate item, as discussed in more detail in Section 5.

Allocation of Time

3.8 A further point that requires discussion concerns the allocation of time. It has been suggested that the host institution should be given an incentive, in the form of a guaranteed proportion of the research time available at the facility, to ensure that the required level of effort and resources continue to be made available to the facility. ASTEC does not agree with this view; in fact, it could be argued that such an arrangement negates the whole concept of shared use based on merit. In practice, the staff of the host institution would be expected to obtain a substantial share of the time available because of the excellence of their research proposals; if this were not so, it is questionable whether the host institution could be a suitable location for the facility. This share would be expected to be more than adequate to allow for any special needs of the host institution (discussed in paragraph 3.2). The provision of time to projects other than those judged to be of the highest merit would only serve to reduce the effective use of the facility. The benefits gained by staff of the host institution through their interaction with outside users of the facility would, in themselves, provide a further incentive.

3.9 Care will be needed in selecting an appropriate host institution to ensure that the facility is maintained properly, but this should not pose any difficulty because the development of a proposal for a national facility necessitates the presence of one or more groups with the required level of expertise and research interests to manage and to compete for time on the facility. The need for efficient operation and maintenance of the facility is not a justification for making block grants of research time available to the host institution. ASTEC is strongly of the view that allocation of research time should be made on the basis of merit. In the case of a facility used primarily for basic research, merit may be assessed as the scientific excellence of the project and the investigators. For other facilities, the significance to national interests of the work proposed, or its commercial significance, may also need to be taken into account. Further special requirements are likely to arise; for example, the oceanographic research vessel will be available for research in only one geographic area at a time, so that location of proposed research projects will be an important criterion in allocating time on a particular cruise. The assessment criteria to be adopted for each facility should be determined by its steering committee.

3.10 The comments made above refer only to research time and do not preclude the provision of time to the host institution for purposes other than its own research programs. Maintenance, periodic upgrading, the testing of new equipment, data collection and provision of services are all activities which may require that the host institution be given a special allocation of operating time at the facility. Determination of the time required, and of its scheduling, should be a matter for discussion between the steering committee and the host institution.

ASTEC recommends:

(i) *That, as a general policy, no guaranteed allocation of research time at a national research facility be made for the host institution or for any other users, and that all proposed projects be assessed on their merits; and*

(ii) *That the allocation of time to the host institution for purposes other than research, such as maintenance of the facility or testing new equipment, be determined by discussion between the host institution and the steering committee.*

4. CHARGES TO USERS

4.1 The purpose of ASTEC's 1978 recommendation, that practical and reasonable charges be made to users of national research facilities, was to encourage sensible use of the resources available for science and technology. Efficient use of a national facility will be achieved if time allocation is based solely on the merit of research proposals, the term 'merit' including scientific excellence, relevance to national objectives, commercial significance or other criteria depending upon the particular facility; but how is the priority of funding the facility itself to be judged in competition with other research activities for which government funds are sought?

4.2 The physical equipment at the core of most national research facilities will have a limited life-span. Sooner or later it will be superseded by an improved version or, as was the case with nuclear magnetic resonance instruments, changes in technology will result in similar equipment becoming more widely available for purchase by individual research groups. Eventually, decisions will have to be made on the future priority of the facility, whether there is still a national need for it and whether expenditure on upgrading it represents the best use of funds. Some mechanism is needed to enable the Government, which is providing the funds, to monitor the continuing need for the facility.

4.3 If time at the facility is made available free of charge, that is, if all costs are met directly by the government, its continued operation may lead to a wasteful use of resources. If, on the other hand, charges are levied which reflect project costs, the government can be sure that a subsequent high rate of usage reflects a continuing need for the facility perceived by scientists and by relevant funding bodies. In other words, when scientists have to use a part of their research budget to pay for access to a national research facility, the rate of use provides a valuable measure of the continuing need for the facility.

4.4 The next task is to consider what might constitute 'practical and reasonable' charges. It is not possible to make specific recommendations which will cover all types of national research facilities because of their diverse nature. Policies on charging will need to vary from facility to facility, and their development should be the responsibility of the individual steering committees. However, ASTEC is able to suggest some general guidelines as to what part of the costs of a facility might be recovered through charges to users.

4.5 The costs associated with establishing and operating a national research facility can be divided into the categories of capital, operating and project. Capital costs are the expenditure required to establish the physical entity of the facility, and might include design costs, the purchase of scientific instruments or equipment, construction of a building, commissioning and so on. Charges for use of a national research facility should not seek to recover its capital cost, even at a low rate amortised over its life-span. The purpose of establishing the facility is to derive a national benefit, and it is reasonable to view the capital expenditure as part of the price paid for the substantial benefits anticipated. Indeed, if it were proposed or possible to recover all costs, including capital expenditure, it might be questioned whether the facility could not be established and operated under normal commercial practices and without the need for government support.

4.6 Operating costs are expenditure required to develop and maintain the facility in a state of readiness for its research functions, including periodic upgrading (a major upgrade, requiring substantial additional capital expenditure, would have to be considered separately). They include the salaries of technical, maintenance and administrative staff, direct maintenance costs, and a proportion of the overhead costs of fuel and power, lighting, telephones etc. There are several reasons why full recovery of operating costs, through charges to users, is not practicable. First, the operating costs, like the capital costs, can be considered to be

part of the price paid by the community for the benefits derived from the facility. Secondly, many researchers will be relying on grants provided by national research granting schemes to pay their charges; if all or part of the operating expenditure for the facility is to be obtained from charges, any administrative or other delays in finalising grants would result in a shortfall in operating funds for the facility. It is not sensible to provide funds to establish an expensive facility and then run the risk of not making full and efficient use of it because of inappropriate charging arrangements. Moreover, the arrangements required to enable Commonwealth Government organisations to retain monies raised through charges may present some administrative difficulties because such monies are usually returned to the Consolidated Revenue Fund.

4.7 Thirdly, for many facilities it will not be possible to recover operating costs (as distinct from project costs) through charges because either the charges would be excessive, or because they would infringe international conventions which currently benefit Australian scientists. For example, the operating costs of an oceangoing research vessel would include fuel, victualling, the salaries of the crew and technical staff and maintenance of the vessel and its equipment, when in port as well as on station. If these were to be recovered in full the rate of charges would be so high as to prohibit many potential users and would act against the concept of a facility whose use is based on scientific merit (rather than access to a large research budget). Astronomical observatories are an example of facilities for which, by international convention, operating costs are not included in charges. It is a long-established procedure the world over that charges for access to telescopes, if made at all, are set to recover only the costs of consumable items used by the researcher. A decision to charge for operating costs at Australian telescopes would be likely to result in increased charges, and possibly reduced access, for Australian astronomers using overseas facilities.

4.8 Project costs are defined as those related to the use of the facility for a particular research project. They might include consumable items used in the research, and accommodation costs for visiting scientists. If specialist staff associated with the facility (that is, excluding operating staff) are required for a particular research project, a proportion of their salary costs should be assigned to 'project costs', and users will be expected to provide any equipment or other capital items required only for their own project. Project costs represent the marginal cost of the conduct of a research project, and it is reasonable for this cost to be borne by the investigators from existing resources outside the facility. In general, charges should attempt to recover all project costs associated with a particular program of research, but again some flexibility in the arrangements for each facility will be necessary.

4.9 The distinction between operating and project costs may, for some facilities, be rather arbitrary. The guiding principle, to be borne in mind by each steering committee when determining project costs, is that the level of charges should be such as to encourage efficient national use of the facility without disadvantaging particular groups of potential users. Charging arrangements should also be consistent with Commonwealth Government policy, and steering committees may need to discuss this matter with the Department of Finance.

4.10 These comments on charging policy refer to facilities used exclusively for research purposes by non-commercial organisations. Companies may also wish to utilise the resources available at a national facility for their research programs. In ASTEC's view, all users of a particular facility should be charged at the same rate, that is, to recover project costs, providing they are using the facility's resources for research only and time is allocated to them on the basis of merit. This would apply to use of a facility by industry. Some facilities may be capable of providing valuable services such as testing or measurement in addition to their research function. Charges for services which are used for commercial benefit should be at commercial rates, and would therefore include components of operating and capital costs. The allocation of facility time for provision of services, which should not be at the expense of research activities, and the determination of the charges to be made, are properly the responsibility of the steering committee.

ASTEC recommends:

That, as a general policy, charges for use of a national facility for research be levied at a rate sufficient to recover all project costs but not capital or operating expenditure.

5. FINANCING NATIONAL RESEARCH FACILITIES

5.1 The primary rationale for government involvement in financing a national research facility is that although the facility is anticipated to benefit the nation's science and technology effort, it is too expensive to be established and operated by a single research organisation or group of scientists. Moreover, the benefits of the facility may not have a direct or immediate economic value, thus making it unattractive for commercial operation, or it may be impossible for any single organisation to capture sufficient benefit to give the facility a high priority within its own budget.

5.2 It has been argued that the 'user pays' principle should be applied in formulating funding arrangements for national research facilities, that is, that all costs should be borne by the users. Under such a system, charges would be set so that all costs could be recovered and returned to government revenue. It would be possible to apply this principle only if research funds matched total costs. In fact, a proposal for a new national research facility arises for the very reason that existing sources of funds are not sufficient to support its establishment and operation. The justification for seeking additional public funds is that the facility will provide tangible benefits, perhaps not only in terms of advanced research and development but also in training and commercial innovations; less direct benefits may result from the facility acting as a focus for interaction by scientists from a range of organisations.

5.3 For these reasons it is entirely appropriate for government to provide financial support for the planning, construction and operation of national research facilities if there are believed to be sufficient benefits to the community. However, such expenditure will need to be considered in

competition with requests for funds for other government-supported activities, including those in science and technology. Any proposal for a new national research facility should therefore provide full information on the purpose of the facility, the anticipated rate of use and the planned level and sources of funding, including:

- evidence of the need for the facility and identification of organisations or research groups that would use it;
- a clear statement of the objectives of the facility and definition of the benefits anticipated;
- reasons why the facility cannot be provided through existing mechanisms, for example, from within the budgets of research organisations or of mission-oriented research-grants schemes, or by commercial operation;
- a detailed budget for both capital and operating costs, including maintenance and possible upgrading, for a suggested initial operating period (normally three to five years);
- consideration of alternative means of establishing the facility, for example, whether leasing of equipment would be feasible instead of purchase;
- a statement of what resources (including direct funds, overhead costs or secondment of existing staff), if any, are to be provided by the proponents or their organisations; and
- where appropriate, suggestions of suitable host institutions at which the facility could be located, and of general management and changing arrangements including identification of project costs.

5.4 This information should provide a sound basis for consideration of any proposal for a new national research facility. In respect of financial support for a new facility, the argument developed in Chapter 4 concluded with the view that capital and operating costs should be provided by the Government, and project costs recovered through charges to users. These two categories will now be discussed further.

Capital and Operating Costs

5.5 When a decision is taken by government to support the creation of a new facility, a steering committee should be appointed by the relevant Minister and, where necessary, agreement reached on an appropriate host institution to manage the establishment and operation of the facility. In most instances, a government decision to proceed with a new facility will include

provision of an initial allocation of capital within the Budget to allow planning and establishment of the facility to begin. The further capital sums required, as specified in the original proposal, will be provided as annual Budget allocations to the host institution, so that each year the steering committee and host institution will need to develop jointly a submission for the next year's funds.

5.6 Funds to be provided to the host institution for the operational expenditure of the facility will need to be sought in a similar manner, that is, by submitting an estimate of the level of funds required in the forthcoming year for inclusion in the normal Budget processes for on-going expenditures. Again, this should be a joint exercise involving both the steering committee and the host institution. It is likely that the host institution will be either a part of a Commonwealth Government organisation or of a tertiary education institution; in either case there should be no administrative difficulty in providing an allocation of government funds for capital or operating expenditures.

5.7 Provision of capital and operating funds for a national research facility within the budget of its host institution, without separate identification, may result in conflicts of interest, especially during a period of severe expenditure restraint. On the one hand there is the danger that savings in expenditure will be achieved through disproportionately heavy reduction of the facility's operations; on the other hand, continued full operation of the facility in response to demand might become an unreasonable drain on the host institution's own resources. There are clear advantages in having the funds for the facility, which has been established for national use, identified separately from those of the host institution.

ASTEC recommends:

(i) That annual estimates of funds required for capital and operating expenditures of a national research facility be developed jointly by the steering committee and host institution; and

(ii) That funds provided to the host institution for such expenditures be provided as specific allocations identified separately from, or within, the institution's budget.

5.8 Some time before the end of the initial operating period of three to five years, steps should be taken to review the effectiveness of the facility and the continued need for it. The level of use of the facility, as recorded in the annual report of the steering committee, will give a clear indication of its value as perceived by scientists. Consideration should also be given to the future role of the facility, to whether major upgrading is required or warranted, and to whether the level and type of use justifies its continued operation. Responsibility for initiating the review, and for acting on its results, should rest with the Minister responsible for the establishment of the facility.

Project Costs

5.9 The arguments in support of ASTEC's view that charges, consisting of project costs only, should be levied on users of national research facilities are set down in Section 4. Under this system, time on the facility would be allocated by the steering committee, and research groups or individual scientists would have to provide the project costs for their work from existing resources. Charges to cover project costs would have to be met before the project could proceed, so that there would be a strong mechanism to ensure that charges were collected and that use of the facility was based on real need.

5.10 This procedure does suffer from the disadvantage that allocation of time at the facility, and provision of funds for the research, are separated. There is therefore a potential for mismatches, with some users who have been allocated time being unable to obtain sufficient funds, and vice versa. For some facilities the project costs will be relatively low, and all potential users should be able to obtain sufficient funds without difficulty or delay. For facilities where project costs are substantial, for example the oceanographic research vessel, each user will need to plan his or her program of research months ahead, giving adequate time to obtain the funds required.

5.11 An alternative to this procedure, which might be suitable for some types of facility, is that adopted by the Australian Institute of Nuclear Science and Engineering (AINSE - see paragraphs 2.11, 2.12). Organisations whose research staff use the facility would pay an annual membership fee. Scientists, once their proposal was accepted, would pay the project costs for use of the facility, but these would be partially or completely re-imbursed using the membership funds, or other funds available to the steering committee. Such funds could also be used to support student research, to employ technical staff and to subsidise travel costs for users from remote locations (thus preserving the 'national' identity of the facility).

5.12 This procedure is perhaps best suited to a facility which comprises several pieces of equipment or laboratories. It has the advantages that scientists whose research proposals are accepted can be sure of some support to cover project costs, and that member organisations, having paid a fee, have a strong incentive to ensure that the facility is used effectively and maintained properly. It has the disadvantage that charges are not paid directly by users, and there is therefore some weakening of the mechanism which ensures efficient use of the facility. This disadvantage would be largely overcome if the disbursement of funds was at the discretion of the steering committee, and was made only after the merit of each proposal had been properly assessed.

5.13 Other alternative systems which have been proposed for financing project costs would not satisfy the requirements described in Section 4. Arranging for the steering committee to allocate additional government funds (to cover project costs) as well as time would ignore the requirement to recover costs from users and, since each steering committee would in effect become a research-grants body, would lead to excessive fragmentation of research funding.

ASTEC recommends:

That charges for use of a national research facility be met by users from their existing resources, recognising that there are several ways in which these resources can be marshalled to cover project costs.

WORKING PARTY ACTIVITIES

In March 1982 ASTEC established a small working party to give further consideration to developing policy guidelines for the management and funding of national facilities. Its membership was:

Mr J.N. Davenport (Convenor), Company Director, and a member of ASTEC;

Dr L.W. Davies, Chief Scientist of Amalgamated Wireless (Australasia) Limited and Professor of Electrical Engineering at the University of New South Wales, and a member of ASTEC;

Professor D.H. Green, Professor of Geology at the University of Tasmania, and a member of ASTEC;

Professor M.G. Porter, Director of the Centre for Policy Studies at Monash University, and a member of ASTEC; and

Sir John Wilson, Chairman of Australian Paper Manufacturers Limited, and a member of ASTEC.

Because of Mr Davenport's other work commitments within ASTEC, Dr Davies took over the position of Convenor of the working party from June 1982. The terms of appointment to ASTEC of Dr Davies and Sir John Wilson were completed in February 1983, but Dr Davies maintained his membership of the working party in order to complete its report.

The working party met on several occasions in 1982 and 1983, and held discussions with the following:

Professor D.C. Morton, Director, Anglo-Australian Observatory;

Mr E.A. Palmer, Executive Officer, Australian Institute of Nuclear Science and Engineering;

Dr D.G. Walker, Director, Lucas Heights Research Laboratories, Australian Atomic Energy Commission;

Mr I.L. Farrar, Assistant Secretary (Budget), CSIRO;

Professor R.W.R. Rutland, Director, Bureau of Mineral Resources, Geology and Geophysics;

Dr A. Jones, Head, National Nuclear Magnetic Resonance Centre, the Australian National University;

Mr J. Galloway, Department of Finance; and

Professor B.Y. Mills, Astrophysics Department, the University of Sydney.

The Council considered a first draft report of the working party at its meeting in August 1982. Reduced staff resources within the Secretariat caused a delay in revising the report. A further draft was considered by the working party in April 1983 and a revised version, incorporating amendments suggested by departments, agencies and individuals, was presented to the September meeting of ASTEC. Further amendment to take account of that discussion resulted in the final report

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