CHAPTER 2

Commerce, Industry and Technology Bureau

Innovation and Technology Commission

Funding of projects under the Applied Research Fund

Audit Commission
Hong Kong
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This audit review has been carried out under a set of guidelines tabled in the Provisional Legislative Council by the Chairman of the Public Accounts Committee on 11 February 1998. The guidelines were agreed between the Public Accounts Committee and the Director of Audit and have been accepted by the Government of the Hong Kong Special Administrative Region.

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FUNDING OF PROJECTS UNDER THE APPLIED RESEARCH FUND

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PART 1: INTRODUCTION

1.1 This PART describes the background to the audit and outlines its objectives and scope.

Establishment of the Applied Research Fund

1.2 In his October 1997 Policy Address, the Chief Executive set forth a vision of making Hong Kong an innovation centre for the region. In line with this vision, the Government is committed to promoting innovation and technology as important drivers underpinning Hong Kong's future economic development.

1.3 The Applied Research Fund (ARF) is a government-owned venture capital fund (Note 1). The predecessor of the fund was the Applied Research and Development Scheme (ARDS), which was set up in 1993 with a capital injection of $175 million to provide support for technology venture. In June 1995, the Finance Committee (FC) of the Legislative Council (LegCo) approved another $50 million for the setting up of the Cooperative Applied Research and Development Scheme (CARDS). The CARDS aimed to provide finance to local companies which collaborated with Mainland researchers in technology venture.

1.4 In October 1997, the Audit Commission (Audit) completed a review on the administration of the ARDS and CARDS. The audit observations were included in the Director of Audit's Report No. 29. In January 1998, the then Industry Department, taking into account the vision depicted in the Chief Executive's 1997 Policy Address and audit recommendations, reviewed the operation of the ARDS and CARDS. The review concluded that the two schemes filled a gap in providing a readily available source of finance for technology start-ups and technology upgrades.

1.5 In March 1998, the Government obtained funding approval from the FC to make a further capital injection of $525 million into a new fund (i.e. the ARF) formed by merging the ARDS and the CARDS. Pooling the remaining capital of $225 million of the ARDS and the CARDS, the ARF had a start-up capital of $750 million.

Note 1: *Venture capital is commonly defined as equity-related financing provided to unlisted companies. It is invested in projects that have a high risk of failure, but that will bring large profits if they are successful.*

Objectives of the Applied Research Fund

1.6 The main objective of the ARF is to encourage technology ventures and research and development (R&D) activities that have the potential to yield commercially exploitable results in Hong Kong, by providing government funding as a catalyst. The longer-term aim is to increase the technological capability and hence the competitiveness of local industry, thereby promoting high value added economic development in Hong Kong.

1.7 In March 1998, the Chief Executive appointed the Chief Executive's Commission on Innovation and Technology to advise him on the measures necessary to fulfil his vision of making Hong Kong an innovation centre for the region. The Commission considered that the ARF was a good scheme that should continue. It also considered that the ARF could be used as a leverage to induce private capital investment by supplying equity capital directly to technology-based companies.

Institutional arrangement of the Applied Research Fund

1.8 The ARF is controlled and administered by the Applied Research Council (ARC), a private company formed in August 1992 and wholly owned by the Government. With a Board of Directors comprising industrialists, professionals and academics, the ARC assumes a supervisory role to ensure that the public mission (Note 2) of the ARF is met.

1.9 The Innovation and Technology Commission was established within the Commerce, Industry and Technology Bureau (CITB) in July 2000. The Innovation and Technology Commission has taken over the former role of the Industry Department to act as the Secretariat of the ARF and represents the ARC in its day-to-day activities.

Note 2: *To pass the "public mission test", the investee companies must:*

(a) be incorporated in Hong Kong under the Companies Ordinance (Cap. 32) and have a substantial proportion of their research, design, development, production, management or general business activities carried out in Hong Kong; and

(b) have a technology element which includes:

(i) the development or application of technologies for product/process innovation and development;

(ii) the acquisition of technologies from outside sources for further development/adaptation to meet market needs; and

(iii) the utilisation of emerging or new technologies which either match Hong Kong's strengths or will create synergy with existing industries in the Hong Kong economy.

The framework on management of investments

1.10 Before November 1998, the Industry Department was responsible for assessing investment proposals in consultation with external assessors from local universities and industry support bodies. The Board of Directors of the ARC made the final investment decisions.

1.11 Since November 1998, venture capital firms have been engaged as fund managers. They have full power to assess the technical and commercial viability of investment proposals, and make investment decisions. The ARC may veto their investment decisions if the investee companies do not meet the "public mission test" (see Note 2 of para. 1.8).

Audit review

1.12 Audit has recently carried out a review on the provision of funding support to applied R&D projects under the ARF. The audit review focused on the performance of the investments made by the ARF and the utilisation of funds.

PART 2: COSTS AND ACHIEVEMENTS OF THE APPLIED RESEARCH FUND

2.1 This PART takes stock of the costs and achievements of the ARF (including the two predecessor schemes).

Parameters for appraisal of achievements

2.2 As mentioned in paragraph 1.6, the main objective of the ARF is to encourage technology ventures and R&D activities that have the potential to yield commercially exploitable results in Hong Kong, by providing government funding as a catalyst. The longer-term aim is to increase the technological capability and hence the competitiveness of local industry, thereby promoting high value added economic development in Hong Kong.

2.3 In 1992, the Industry Department developed the following parameters to evaluate the future performance of the ARDS which was then in the pipeline:

(a) number of applications received;

(b) number of worthwhile project proposals approved for funding support;

(c) amount of private sector R&D generated;

(d) intellectual property rights (e.g. patents and designs) developed;

(e) sales revenue attributable to new processes/products developed;

(f) direct financial returns of government investment;

(g) profits tax generated; and

(h) other spin-offs including R&D manpower trained, contract research work generated for universities and inward investment secured.

2.4 On the point of direct financial returns of government investment (i.e. item (f) above), the following events are relevant:

(a) ***Target return of 5% per annum.*** In seeking funds to set up the ARDS in December 1991, the Government informed the FC that funds disbursed under the ARDS would be regarded as government investment in the projects. Given the risk inherent in R&D, the Government was unlikely to be able to recoup its investment in all supported projects. However, the approach proposed should allow the Government to reap returns over and above its investment in successful projects. The Government would seek a return of **at least 5% per annum** on the sum advanced. The return would not necessarily be received on an annual basis and might accrue over a period pending the successful completion of some funded projects; and

(b) ***Seeking the best return rate achievable.*** In seeking the FC's approval for funding injection into the ARF in March 1998 (see para. 1.5), the Government informed the FC that the target rate of return of at least 5% for the ARDS should be dropped. The need to protect the seed capital and the requirement for a 5% return had created a hampering effect on the ARC in providing equity injection to approved projects because the return in the form of dividend was less certain. Consequently, most of the approved projects had been given loans with rather stringent conditions, such as guarantee requirements and interest at around prime rate. This had in turn a dampening effect on potential applications and the ARDS had therefore failed to attract quality applications. This inflexibility had a wider implication: the ARDS would not be able to achieve its public mission to facilitate more R&D activities and technology ventures in Hong Kong. The Government would ask the ARC to aim for **the best return rate achievable** from its investment as it, through the professional fund managers, worked within the parameters of the ARF's public mission. This would provide more flexibility in deciding the terms of the projects. The revised arrangement would provide an incentive for all parties involved, including the fund managers and the investee companies, to try to make the projects commercially viable and profitable. This in turn would help ensure that the best achievable rate of return was secured.

2.5 **The above events indicate that the Government recognised the risky nature of the investments. However, it also expected an investment return. This was originally set at "at least 5% per annum on the sum advanced". It was revised in March 1998 to "the best return rate achievable" because of the need to provide for flexibility.**

1998 review by the Industry Department

2.6 In 1998, the Industry Department reviewed the ARDS and the CARDS using the above parameters (see paras. 1.4 and 2.3). The review found that:

(a) the actual performance of the schemes had not been as impressive as they were originally envisaged. Nevertheless, they had filled a gap in providing a readily available source of finance for technology start-ups and upgrades;

(b) it was difficult to come to any definitive conclusion on whether the schemes had met their objectives;

(c) there were difficulties in obtaining from the investee companies commercial sensitive information such as sales revenue and profits tax. As a result, the review could not reliably assess the commercial viability of the new technology venture; and

(d) the use of civil servants working part-time as secretariat staff as well as fund manager, coupled with external assessors from the local academic community, was inadequate in the proper running of schemes of this nature. The schemes should be managed by full-time professional fund managers who had the experience and expertise in similar technology-related investments.

2003 review by the Applied Research Council

2.7 The CITB briefs the LegCo Panel on Commerce and Industry of the position of the ARF on a regular basis. In March 2002, the LegCo Panel expressed concerns about the investment losses incurred by the ARF both before and after the engagement of fund managers. To address such concerns, the ARC reviewed the ARF, focusing on its performance since the engagement of fund managers, the technology business and investment environment, and the role and future of the ARF. **In February 2003, the LegCo Panel was informed that the ARC considered that there should not be major changes to the present modus operandi, nor should the uncommitted funds be aggressively deployed.** The LegCo Panel was also informed that:

(a) as at 31 December 2002, the valuation of 21 investments managed by fund managers was $231 million, representing 67% of the approved funding of $346 million. Five of these investee companies were liquidated or sold at nominal value;

(b) among the remaining 16 active investments, one was listed on the Growth Enterprise Market in May 2002, another was acquired in February 2000 by a company listed in the Hong Kong Stock Exchange, and four had won prestigious technology awards either locally or overseas;

(c) the 16 active investee companies attracted investments amounting to about $870 million other than from the ARF. This represented a multiplier factor of roughly 3.2 against the corresponding approved investment from the ARC;

(d) 12 active investments were small and medium-sized enterprises with less than 50 employees at the time of first investment. Three of them had since gone beyond this employment level;

(e) the engagement of fund managers had enabled the ARF to attract more interest and investment than before when it was operated by civil servants. Before the engagement of fund managers, there were only 27 funded cases with funding support of $97 million over a period of six years. After their engagement, there were 17 cases with approved funding support of $311 million within the first two years;

(f) the engagement of fund managers was a major improvement. Although a number of investee companies did fail under financial austerity or adverse market conditions, the fund managers as a whole had been able to support the investee companies for technology and business development, providing the necessary networks and coaching. While the business and investment climate had been very difficult in the past two years or so, the ARF did represent a useful public policy tool which worthwhile technology ventures might turn to for investments and support; and

(g) in the light of the current business and investment environment for technology-based ventures, the ARC considered that there should not be major changes to the present modus operandi, nor should the uncommitted funds be aggressively deployed. However, it would continue to consider and explore potential opportunities and possible ways to improve the fulfilment of the ARF's public mission, albeit in the current difficult investment climate.

Options considered by the Applied Research Council

2.8 One month before reporting to the LegCo Panel, in January 2003 the ARC discussed the role and future of the ARF. The ARC noted that, if the existing modus operandi was to continue, the performance of the ARF would likely remain very sluggish in the foreseeable future, given the weak investment climate which might persist for some time. **The ARF would unlikely bring about local technology development opportunities with visibility or impact. It risked losing its purpose as a public policy tool to spearhead technology development.** Various options on the future positioning of the ARF were considered in an ARC discussion paper of January 2003, including the following:

(a) ***Discontinuation of the ARF.*** The current difficult investment climate did argue for the continued existence of government venture fund which worthwhile technology ventures might turn to when support was badly needed. The ARF was part and parcel of the Government's integral public programme support (Note 3), the ultimate aim of which was to enhance the competitiveness of Hong Kong through technological development and upgrading. As such, the ARF was part of the total package essential to the development and spawning of technology ventures, and could leverage on private sector expertise under the existing modus operandi. The ARF had a continuous role to play in furthering and supporting innovation and technology development in Hong Kong;

(b) ***Extending the ARF's ambit to the Mainland or overseas.*** To address the lack of local quality investments, the ARF might consider investing in technology ventures elsewhere, so long as they had some connections with Hong Kong. This would arguably be able to enhance the quality, if not the quantity of technology investments in Hong Kong. This concept would be tantamount to the ARF investing on an extra-territorial basis. This was allowed under the existing modus operandi so long as the connections with Hong Kong had substantive technology development elements. However, it would not fulfil the ARF's mission if the connections with Hong Kong only related to setting up business headquarters, sales and marketing activities with main technology development activities being carried out extra-territorially;

(c) ***Funding external ventures to be set up in Hong Kong.*** The ARC might explore the feasibility of the ARF matching investments in external technology companies (say, from Silicon Valley), subject to a necessary condition that they should set up R&D or technology-related business operations in Hong Kong, for instance in the Science Park or Cyberport; and

(d) ***Co-fund with industrialists/financiers.*** The ARF might establish a fund, with matching contributions from a consortium of industrialists and/or financiers, for investment in technology ventures. The consortium would then manage the fund on behalf of the ARC with a management fee. A good consortium might have better feel of the technology market in the Mainland or in the region. However, this option might encounter similar issues concerning extra-territoriality as mentioned in (b) above. It might also give rise to concern that the consortium would put commercial consideration before public mission.

Note 3: *This refers to the Government's support for:*

(a) the development of generic, platform technology;

(b) university-industry collaboration in applied R&D;

(c) techno-entrepreneurship; and

(d) provision of infrastructure building and manpower training.

2.9 **In January 2003, the ARC agreed that the review of the ARF was an important issue which needed to be examined on an ongoing basis. The ARC would continue to review the ARF in the run-up to November 2004 in the light of the Government's overall strategy in supporting technology development.**

Audit assessment of the performance of the Applied Research Fund

2.10 Against the above background, Audit has recently assessed the performance of the ARF up to November 2003. The audit has focused on the following financial aspects of the performance:

(a) financial return of invested projects (see paras. 2.12 to 2.14);

(b) costs of operating the ARF (see paras. 2.15 to 2.17); and

(c) utilisation of available funds (see paras. 2.18 to 2.20).

2.11 In conducting the review, Audit is mindful of the fact that there are other non-financial objectives of the ARF, and that the achievements of the ARF should not be judged solely on the basis of financial performance. However, the fulfilment of those non-financial objectives is difficult to measure. Therefore, Audit has focused on those financial aspects of the ARF which can be measured objectively and which Audit considers are important by themselves.

Financial return of invested projects

2.12 ***Overall performance.*** Up to November 2003, the ARF had invested \$461 million in 50 projects, including 26 completed projects and 24 active projects. As indicated in paragraph 2.5, the Government expected a financial return from the invested projects. Based on the latest valuation, however, the ARF investments overall suffered a capital loss of \$247 million, or 54% of the sum invested. Table 1 shows that 32 projects suffered a capital loss to varying degrees, with many suffering a near total loss.

Table 1

Analysis of capital loss of invested projects

	Number of projects		Capital loss (Note) ($ million)
No loss	18		–
Loss			
less than 50%	4	32	14
50% to 90%	10		87
91% to 100%	18		146
Total	**50**		**247**

Source: *ARC records*

Note: *The capital loss of $247 million included $107 million of realised loss for completed projects. The remaining $140 million were unrealised loss, representing the difference between the original investment value and the latest valuation of those projects not yet completed.*

2.13 ***Fund managers' performance.*** Fund managers have been engaged since November 1998 to improve the performance of the ARF (see para. 2.6(d)). However, the analysis in Table 2 shows that, in terms of capital loss, the performance of investments made after the engagement of fund managers has not improved.

Table 2

Performance of investments
made before and after the engagement of fund managers

	Before	**After**
Number of investments	27	23
Amount of investments	\$83 million	\$378 million
Latest valuation	\$41 million	\$172 million
Percentage of capital loss	50%	54%

Source: ARC records

2.14 ***ARC comments.*** In response to the above audit findings, the ARC has informed Audit that:

(a) ***Prudence in valuation.*** The below-cost valuation is primarily due to prudence on the part of the fund managers in valuating the investments in view of the financial situation confronting some investee companies and the generally unfavourable investment climate worldwide for technology businesses in the past few years; and

(b) ***Global and industry context.*** The capital loss of ARF investments should be viewed in a wider global context. The financial return of the ARF is not immune to the rather soft technology investment market worldwide. The valuation of ARF investments, being 54% below its original cost of investment (see Table 2 in para. 2.13), is not out of line with the much more mature US venture capital market which shows a capital loss of about 38% (Note 4).

Note 4: *For instance, industry statistics of the US show that the three-year result of venture capital funds in the US formed in 1999 (roughly the time when the ARF started to be operated by venture capitalists) was that for every dollar investment, it gave a combined realised and residual valuation at only 62 cents. This effectively translated into a capital loss of about 38%.*

Costs of operating the Applied Research Fund

2.15 Apart from capital losses, it is important to take into account the costs of operating the ARF in assessing its performance. The costs to be taken into account should, for this purpose, consist of the following major elements:

(a) staff costs of the Secretariat of the ARC;

(b) the management fees paid to the fund managers since their engagement in November 1998; and

(c) other administration and operating expenses.

2.16 ***Audit findings.*** Audit found that, up to November 2003, the total operating costs of the ARF amounted to $127 million. This represented 28% of the $461 million investment made so far. Table 3 shows an analysis of the costs by the three major elements.

Table 3

Analysis of the costs of the Applied Research Fund (up to November 2003)

	$ million
Staff costs of the Secretariat (Note 1)	26
Management fees paid to fund managers (Note 2)	83
Other administration and operating expenses (Note 1)	18
Total	**127**

Source: ARC records

Note 1: For the period from August 1992 (i.e. establishment of the ARC) to November 2003.

Note 2: For the period from November 1998 (i.e. when fund managers were first engaged) to November 2003.

2.17 ***ARC comments.*** In response to the above audit findings, the ARC has informed Audit that:

(a) the structure of the management fees paid to fund managers has been revised from lump-sum fixed fees to performance-based fees;

(b) the effect is that the fees paid to fund managers gradually decreased from $44 million in the first two years to $39 million in the last three years; and

(c) it is estimated that the total management fees will further decrease to about $18 million in the coming four years if investments stay at the current level.

Utilisation of available funds

2.18 The ARF had an initial capital of $750 million. As at November 2003, it had a large cash balance of $434 million available for new investments. At a meeting with the ARC in December 2001, a fund manager indicated that:

(a) there was difficulty in identifying quality prospective investee companies in Hong Kong; and

(b) the venture capital industry was well developed in Hong Kong and there were abundant sources of venture capital.

2.19 ***Audit findings.*** Audit analysis of the trend of ARF investment indicates that the difficulty in identifying quality investee companies has remained. Only five new investments have been made since April 2001. Furthermore, no new investment has been approved since May 2003. Table 4 shows the details.

Table 4

Applied Research Fund investments from November 1998 to November 2003

Year	New investments		Follow-on investments (Note 1)		Total investments	
	(a)	(b)	(c)	(d)	(e) = (a) + (c)	(f) = (b) + (d)
	Number	$ million	Number	$ million	Number	$ million
1998-99 (Note 2)	5	95	–	–	5	95
1999-2000	8	96	3	21	11	117
2000-01	5	50	7	40	12	90
2001-02	1	8	5	22	6	30
2002-03	3	27	–	–	3	27
2003-04 (Note 3)	1 (Note 4)	5	1	14	2	19
Total	**23**	**281**	**16**	**97**	**39**	**378**

Source: ARC records

Note 1: These were follow-on investments made to existing investee companies.

Note 2: November 1998 to March 1999.

Note 3: April to November 2003.

Note 4: This was the latest new investment. It was approved by the ARC in April 2003.

2.20 ***ARC comments.*** In response to the above audit findings, the ARC has informed Audit that, taking a global perspective, the technology investment market has been soft in the past few years. For instance, statistics show that venture capital investment in the US slumped in 2003 to its lowest level since 1997. US$18 billion were invested in 2003, representing a decrease of 15% from the investment in 2002.

Audit observations

2.21 ***Capital losses and operating costs.*** The main objective of the ARF is to encourage technology ventures and R&D activities that have the potential to yield commercially exploitable results in Hong Kong. However, the audit findings indicate that many of the projects receiving ARF funds were commercially unsuccessful, and some had suffered heavy capital losses. Apart from the capital losses of $247 million in investments, operating costs of $127 million were incurred over the years.

2.22 ***Lack of worthwhile projects.*** The audit findings also indicate that there has been difficulty in identifying worthwhile projects for ARF investments. In this connection, a point made in the ARC discussion paper of January 2003 is worth noting. That is, maintaining the status quo of the ARF would "risk losing its purpose as a public policy tool to spearhead technology development". The ARC has considered various options to improve the situation, but none of them seems to offer a ready and viable solution to the existing problem. **The ARC has undertaken to continue to review the ARF in the light of the Government's overall strategy in supporting technology development (see paras. 2.8 and 2.9).**

2.23 ***Need for a comprehensive review.*** Audit welcomes the ARC's undertaking to continue to review the ARF. However, the ARF is part of the Government's innovation and technology programme and a range of infrastructure and other funding support is now offered for applied R&D activities under various government initiatives (see Appendix A). **As such, an overall review would go beyond the ARC's purview. Audit considers that the CITB needs to take the lead in the review. This would ensure that the review has a comprehensive coverage in the context of the Government's overall strategy for innovation and technology development.**

Audit recommendations

2.24 **Audit has *recommended* that the Secretary for Commerce, Industry and Technology should take the lead to critically review the role of the ARF. In performing the review, he should pay attention to the following:**

(a) **the heavy capital losses and the significant operating costs of the ARF;**

(b) **the lack of worthwhile and commercially viable projects that meet the public mission test for ARF support; and**

(c) **the availability of venture capital from other sources.**

Response from the Administration

2.25 The **Commissioner for Innovation and Technology**, on behalf of the CITB and the ARC, has said that they will keep the operation of the ARF under review to ensure its contribution to and alignment with the Government's overall strategy. This is in line with the audit recommendation in paragraph 2.24. He has also said that:

(a) ***Achievements.*** In assessing the performance of the ARF, due consideration should be given to its public mission and other indirect and wider benefits accrued from it. Since the engagement of fund managers in 1998, the ARF has been able to better benefit the industry through more venture funding, attract more co-investment from the private sector and, in certain specific cases, achieve important milestones like successful public listing or acquisition by publicly listed companies which have not been achieved before. Providing the necessary networks and coaching, the fund managers have been able to support the investee companies for technology and business development. These contributions are essential and have an impact, albeit difficult to quantify;

(b) ***New steering committee formed.*** The ARC has periodically reviewed the ARF in the past (the latest in January 2004) with the assistance of the Innovation and Technology Commission. In January 2004, the Secretary for Commerce, Industry and Technology briefed the LegCo Panel on Commerce and Industry on the strategic framework for innovation and technology development. As then announced, the Secretary has set up a Steering Committee on Innovation and Technology under his chairmanship. The Steering Committee comprises, among others, chairmen of the concerned technology support organizations of public policy programmes (including the Chairman of the ARC). It will, among other things, determine focuses and priorities of government innovation and technology programmes and ensure effective alignment, coordination and synergy among stakeholders. In this context, the Government will ensure alignment of the ARF with the overall strategy and programme in innovation and technology; and

(c) ***New strategic framework being formulated.*** Despite the growth of the venture capital industry in Hong Kong in the past decade, the ARF still has a public mission to fulfil in encouraging and providing funding support to technology ventures and R&D projects that have commercial potential. The Government is formulating a new strategic framework for further innovation and technology development. The framework will adopt a demand-led, market-driven approach. It will also identify technology focus areas where Hong Kong has competitive advantages for optimal use of resources, and will leverage on opportunities presented by the Pearl River Delta and the Closer Economic Partnership Arrangement between Hong Kong and the Mainland. With the new strategy, the role and contribution of the ARF are crucial and necessary to spur technology industry development.

PART 3: DISPOSAL OF COMPLETED INVESTMENTS BY THE FUND MANAGERS

3.1 Under the management agreements with the fund managers, the fund managers may in their absolute discretion realise or sell any of the investments of the ARF at such times and prices and in such manner as they may decide. This PART examines the disposal of completed investments of the ARF made by the fund managers with a view to ascertaining whether there is room for improvement.

Completed projects managed by the fund managers

3.2 Of the 23 investments ($378 million) made by the fund managers since November 1998, six ($75.7 million) were completed. The completed cases suffered a nearly total capital loss of $75.4 million. Table 5 shows the relevant particulars.

Table 5

Six completed cases managed by the fund managers

Case	Amount invested by ARF ($ million)	Amount recovered by ARF ($ million)	Capital loss ($ million)	Remark
A	23.8	–	23.8	Sold at nominal value of US$1
B	15.6	0.3	15.3	Sold at fund manager's assessed value
C	15.5	–	15.5	In liquidation
D	12.3	–	12.3	In liquidation
E	7.8	–	7.8	In liquidation
F	0.7	–	0.7	In liquidation
Total	**75.7**	**0.3**	**75.4**	

Source: ARC records

Audit case studies

3.3 Of the six completed cases, the investee companies in four cases (i.e. Cases C to F) went into liquidation. For Cases A and B, the investments were sold at either a nominal or substantially write-down value. Audit examined these two cases to ascertain the circumstances in which the ARF investments were sold. The audit case studies have found areas for improvement. Details of Case A are given below for illustration. Details of Case B are in Appendix B.

Case A

Item	Date	Key events
(a)	June 1998	The investee company (Company A) was incorporated as a limited company.
(b)	July 1999	The fund manager (Fund Manager A) proposed an investment of $16 million in Company A. The ARC approved the proposal.
(c)	August 1999	$16 million were released to Company A.
(d)	November 1999	In his quarterly report, Fund Manager A estimated an increase in the sales of the company in the near future.
(e)	December 1999	Fund Manager A proposed a follow-on investment of another $16 million in Company A, in order to capitalise on Company A's recent growth momentum and to prevent the ARC's interests in the company from being diluted by other potential investors.
(f)	January 2000	The ARC approved the proposal. The ARC released $7.78 million to Company A. **(Together with the $16 million released in August 1999, the total investment by the ARC in Company A amounted to *$23.78 million*, representing 10% of the company's share capital.)**
(g)	March 2000	In his quarterly report, Fund Manager A reported that sales had increased dramatically on a weekly basis.
(h)	June 2000	In his quarterly report, Fund Manager A reported that Company A was in final negotiations with a leading investment bank for private placement and initial public offer.
(i)	August 2000	**Fund Manager A sold the ARC's shares in Company A to another shareholder at *a nominal value of US$1*. (Note: the ARC was not informed of this transaction until early September 2000, see item (j).)**

Item	Date	Key events
(j)	4 September 2000	In his quarterly report, Fund Manager A informed the ARC that: (i) the underwriter decided not to continue with the anticipated initial public offer; (ii) Company A had run out of cash and was heading towards bankruptcy; and (iii) **another shareholder of Company A offered to take over the company so as to relieve all investors and founders from potential liabilities. Fund Manager A accepted the offer and sold the ARC's shares at US$1.**
(k)	15 September 2000	In an ARC meeting, the Directors of the ARC raised questions about the failure of Company A and how Fund Manager A had come to the conclusion that the ARC should sell its shares at US$1. Among others, the following question/point were raised: (i) why the other shareholder was willing to buy Company A if the company had no future; and (ii) even if the ARC did not sell the shares, it would not make any difference to the ARC in terms of liability and financial outcome, i.e. the ARC would lose all its investments in the company.
(l)	30 October 2000	In an emergency ARC meeting, Fund Manager A reported on the details of the events leading to the sale of the ARC's shares in Company A. The Chairman of the ARC said that it was unsatisfactory that the ARC had not been informed in a timely manner. The meeting noted Fund Manager A's explanation that there had been a lack of communication with the ARC because things had been moving very fast.

Audit comments:

The ARC investment of $23.78 million in Company A was sold to another shareholder at a nominal value of US$1, without the prior knowledge of the ARC. Further audit observations are discussed in paragraphs 3.4 to 3.7.

Source: ARC records

Audit observations

3.4 ***Need to strengthen control.*** The ARC has a duty to ensure that ARF investments are disposed of in a manner most beneficial to the ARF. However, under the existing management agreements with the fund managers, they are given absolute discretion on matters concerning the disposal of the ARF investments (see para. 3.1). This means that the ARC could lose control of the disposal of the ARF investments, as evidenced in the audit case studies. To discharge its duty effectively, in Audit's view, the ARC needs to strengthen its control over the disposal of the ARF investments. This would involve ARC actions in two respects:

(a) future management agreements (see para. 3.5); and

(b) existing management agreements (see para. 3.6).

3.5 ***Future management agreements.*** Audit considers that the ARC needs to include appropriate provisions in future management agreements, requiring fund managers to obtain the ARC's prior approval before they dispose of any ARF investment. **Prior approval is a key control.** It enables the ARC to ensure that fund managers follow good management practices in the disposal of ARF investments. These include:

(a) ***Options evaluation.*** The audit case studies have highlighted the importance of options evaluation. In Case A, for example, the ARF investment was sold at US$1, which was tantamount to a total capital loss. The questions that needed to be addressed were: what other options were considered and why they were rejected. **As the ARC's prior approval was not required under the existing agreements, the ARC did not have the opportunity to ensure that these questions had been adequately addressed;** and

(b) ***Valuation of investments.*** The audit case studies have also highlighted the importance of a proper valuation of an investment before its disposal. **Although the investment was sold at US$1 in Case A, the ARC did not have the opportunity to examine the valuation and, where the valuation appeared unreasonable, to seek a second expert opinion or inspect the records of Fund Manager A (Note 5).**

3.6 ***Existing management agreements.*** The existing agreements will stay in force until 2007-08. Until then the fund managers will have absolute discretion on investment

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Note 5: *The existing management agreements allow authorised representatives of the ARC to inspect the documents and records of the fund managers in respect of the ARF investments and the investee companies, and the appointment of an independent valuer of good standing and repute to conduct a separate valuation of the ARF investments.*

disposal matters. **The ARC needs to negotiate with the fund managers to see how it can strengthen its control over the disposal of its investments.** The ARC needs to seek legal advice on how best it can overcome the hurdle posed by the existing agreements.

3.7 ***Need for more frequent reporting.*** The ARC relies mainly on the quarterly reports submitted by fund managers to review its investments. The audit case studies have highlighted the need for more frequent reviews because the market in which investee companies operate is very volatile. As a case in point, the ARC was not timely informed of the position in Company A because "things had been moving very fast" (see item (l) in Case A). **The ARC needs to consider requiring more frequent (say monthly) reporting by fund managers.**

Audit recommendations

3.8 **To address the issues identified in the audit case studies, Audit has *recommended* that the ARC and the Commissioner for Innovation and Technology should:**

(a) **take vigorous actions to strengthen control over the disposal of ARF investments by fund managers; and**

(b) **consider requiring more frequent (say monthly) progress reporting by fund managers.**

Response from the Administration

3.9 The **Commissioner for Innovation and Technology**, on behalf of the ARC, has said that:

(a) ***Prior approval.*** In Cases A and B, the fund managers acted on the basis of their professional judgement of the market situation. He will consider the audit recommendation to require fund managers to obtain the ARC's prior approval before disposal of any ARF investments; and

(b) ***More frequent reporting.*** The fund managers have to include exit plans whenever applicable in their quarterly presentations at ARC meetings. This will give the ARC an early indication of the exit and disposal plan, and an opportunity to advise on such plans. He will enhance the liaison with fund managers and to get update, say on a monthly basis, between their quarterly progress reports. The ARC Secretariat and Directors have also started to visit the investee companies to acquire firsthand information and a better understanding of the companies.

PART 4: INTEREST EARNED ON SURPLUS FUNDS

4.1 This PART examines the amount of income earned on the surplus funds of the ARF.

Amount of income earned

4.2 As at 30 November 2003, the ARF had surplus funds of $434 million comprising:

(a) $12 million cash in bank; and

(b) $422 million time deposits.

4.3 For the past five and a half years, on average, the ARF earned an interest income of $24.6 million (or 4.4%) a year on its surplus funds. Table 6 shows the details.

Table 6

Interest income from the surplus funds of the Applied Research Fund

Year	**Interest**	**Average surplus funds (Note 1)**	**Return**
	(a)	**(b)**	$\mathbf{(c) = \frac{(a)}{(b)} \times 100\%}$
	($ million)	**($ million)**	**(%)**
1998-99	57.3	707.3	8.1
1999-2000	34.7	641.8	5.4
2000-01	31.5	556.0	5.7
2001-02	14.2	498.0	2.9
2002-03	6.6	469.4	1.4
2003-04 (Note 2)	2.2	444.8	0.7
Average	**24.6**	**552.9**	**4.4**

Source: ARC audited accounts

Note 1: Average surplus funds are calculated by averaging the surplus funds at the beginning and the end of each period.

Note 2: From April to November 2003.

Audit observations

4.4 In comparison, the average rate of return earned by the Government on the fiscal reserves placed with the Exchange Fund was higher. Audit estimates that, if the surplus funds of the ARF had earned a similar rate of return, they would have earned an income of $42.4 million (or 7.7%) a year.

Audit recommendation

4.5 **Audit has *recommended* that the ARC and the Commissioner for Innovation and Technology should consider implementing measures to improve the rate of return for the ARF surplus funds.**

Response from the Administration

4.6 The **Commissioner for Innovation and Technology** has said that there is a need to provide sufficient cash liquidity for the ARF investments or follow-on investments and other day-to-day operating expenses. However, he is willing to consider the audit recommendation for funds which exceed the necessary liquidity level.

Appendix A
(para. 2.23 refers)

Technology infrastructure and other funding support for applied research and development activities

Infrastructure or funding support	Description	$ million
Hong Kong Applied Science and Technology Research Institute Company Ltd	Incorporated under the Companies Ordinance in January 2000, the institute is wholly owned by the Government. It performs relevant and high quality R&D for transfer to industry for commercialization, with a view to elevating the technological level of the local industry in Hong Kong.	700
Hong Kong Science and Technology Parks Corporation	The corporation is a statutory body established in May 2001. One of its services is to cater for the needs of industry by providing premises and services in the Science Park for applied R&D activities.	7,228
Innovation and Technology Fund	This is a statutory fund formally launched on 1 November 1999. It aims to finance projects that contribute to innovation and technology upgrading in industry.	5,000
	Total	**12,928**

Source: *Innovation and Technology Commission records*

Note: *In addition to the above, public funds are allocated for research to higher education institutes through research assessment exercises on a triennium basis. Part of these funds are for research which is application-oriented and relevant to the needs of commerce and industry. In the 2001-04 triennium, $7,590 million were allocated through such research assessment exercises.*

Appendix B
(para. 3.3 refers)

Audit case studies — Case B

Item	Date	Key events
(a)	February 1999	The investee company (Company B) was incorporated as a limited company and commenced operations in Hong Kong.
(b)	December 2000	The fund manager (Fund Manager B) proposed to invest $7.8 million in Company B.
(c)	January 2001	The ARC approved the proposal.
(d)	February 2001	$7.8 million were released to Company B.
(e)	July 2001	In his quarterly report, Fund Manager B informed the ARC that Company B's revenue continued to be minimal. It was expected that the company would need to raise around US$5 million by the end of 2001.
(f)	September 2001	In his quarterly report, Fund Manager B informed the ARC that the position of Company B was very similar to that reported in the last quarter. He was assessing whether the ARC should inject more funds into the company.
(g)	January 2002	In his quarterly report, Fund Manager B informed the ARC that with imminent cash flow problems, Company B was in urgent need of additional financing. Fund Manager B was working on a deal and considering making a follow-on investment of $7.8 million by the ARC.
(h)	February 2002	Fund Manager B proposed to make a follow-on investment of $7.8 million. The ARC approved the proposal and released the amount to Company B. **(Together with the $7.8 million released in February 2001, the total investment by the ARC in Company B amounted to *$15.6 million*, representing 7% of the company's share capital.)**

Item	Date	Key events
(i)	April 2002	In his quarterly report, Fund Manager B informed the ARC that Company B's revenue remained minimal.
(j)	October 2002	In his quarterly report, Fund Manager B informed the ARC that Company B did not make any revenue in the second quarter of 2002. This was due to the continuing deterioration of the telecom market.
(k)	January 2003	In his quarterly report, Fund Manager B informed the ARC that Company B had a net loss of \$5.3 million in the last quarter.
(l)	April 2003	In his quarterly report, Fund Manager B informed the ARC that Company B's financial situation was such that its Board of Directors had discussed whether the company should go into voluntary liquidation. Fund Manager B considered that the company might need to be liquidated unless the company could find a potential investor within a very short period of time.
(m)	17 April 2003	In a letter to the ARC Secretariat, Fund Manager B informed the Secretariat that: (i) the founders of Company B offered to buy back from all holders the company's preferred shares (note: The ARC investment was in preferred shares); (ii) the proposed repurchase of shares would allow the ARC to recover ***\$284,000***, essentially the same amount of money the ARC would have received if Company B had been liquidated right away. Fund Manager B realised that this represented a write down of ***98%*** of the ARF investment in Company B. However, he believed that the share repurchase was the only way the ARF could recover part of its investment; and (iii) he intended to accept the management offer and would sign the final agreement in the next few days.

Item	Date	Key events
		The ARC Secretariat noted that Fund Manager B was not seeking the ARC's approval (which was not required under the management agreement), but was merely giving an early alert. The Secretariat would update the ARC on the matter at its next meeting.
(n)	24 April 2003	**Fund Manager B sold the ARC investment back to the company's management at $284,000 as offered.**
(o)	30 April 2003	The Secretariat informed the ARC of the transaction and undertook to ask Fund Manager B to provide an update on the matter.
(p)	October 2003	(i) In response to the enquiry of the ARC Secretariat, Fund Manager B indicated that the founders of Company B managed to attract investments of US$16 million from investors in the US. A new company would be formed by the founders of Company B and the new investors to take over the intellectual properties and assets of Company B. The new company would work on new technologies targeting cable operators in the US as customers. (ii) In his quarterly report, Fund Manager B informed the ARC that the new company had issued 12,515 ordinary shares (at a nominal value of US$1 per share) to the ARC.

Audit comments:

The ARC invested $15.6 million in Company B. In return, it received $284,000 (representing a capital loss of 98%) from disposal of the investment, and 12,515 ordinary shares (at a nominal value of US$1 per share) in a new company. **Similar to Case A, as ARC's prior approval for the disposal of the investment was not required, the ARC did not have the opportunity to conduct an options evaluation and examine the valuation of the investment before its disposal (see paras. 3.4 to 3.7).**

Source: ARC records

Appendix C

Acronyms and abbreviations

ARC	Applied Research Council
ARF	Applied Research Fund
ARDS	Applied Research and Development Scheme
Audit	Audit Commission
CARDS	Cooperative Applied Research and Development Scheme
CITB	Commerce, Industry and Technology Bureau
FC	Finance Committee
LegCo	Legislative Council
R&D	Research and development